CHARACTERISTICS OF AUTISTIC CHILDREN: A COMPARISON WITH TRAINABLE MENTALLY HANDICAPPED CHILDREN

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE
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We would argue that one answer to the question "What is autism?" is that "autism is a possibility." It is a possibility because it enables us to make a choice, or adopt a view, about an important other person. If we are even part way deluded into thinking that this child does not count--does not have full value--then autism is a hopeless condition. But if we take the view, and this we can do, that autism--whatever it might be medically or psychologically--offers us an opportunity to form an attitude, not just toward our autistic children but all those we meet, then it is, indeed, a possibility. (Webster, 1980, p. 18)

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Investigated in this study were comparisons between 18 autistic and nonautistic trainable mentally handicapped students, ages 5 to 12 years, in regard to object permanence, vocal and gestural imitation, and 15 behavioral characteristics which are combined in a rating scale widely used by educators to identify presence of the autism syndrome. The behavioral characteristics included relating to people; imitating; responding emotionally; moving the body; using objects; adapting to change; responding visually; responding to sounds; using the taste, smell, and touch responses; having fears; communicating verbally; communicating nonverbally; being active; and functioning intellectually. Also investigated was whether there were differences within the autistic and trainable groups on level of development of vocal and gestural imitation.

Autistic children in three Florida counties (Broward, Duval, and Palm Beach) were compared to trainable mentally handicapped children from the same counties. All had been placed using Florida definitions for their respective exceptionalities. They were matched on age (within 6 months), gender, and general intellectual level (i.e., all were three to five standard deviations below the mean).

Children in the autistic and trainable programs were found to be significantly different on the Vocal Imitation and Gestural Imitation scales of the Uzgiris and Hunt Scales of Infant Psychological Development, the Imitation scale of the Psychoeducational Profile, and the behavioral characteristics of the Childhood Autism Rating Scale. They were not found to be significantly different on the Visual Pursuit and the Permanence of Objects scale of the Uzgiris and Hunt.

The autistic children scored significantly different on the gestural imitation than on the vocal imitation scales of the Uzgiris and Hunt. The trainable children did not.

Conclusions were that, in the state of Florida, mentally handicapped children in the autistic program have not developed the ability to imitate vocally or gesturally as well as those in the trainable program. Autistic students exhibit behavioral disorders more than trainable students do. They are not different from trainable students in development of object permanence. Autistic students are stronger in gestural than vocal imitation. Trainable students are the same in both. Individual Education Programs should reflect differences found.

CHAPTER I
INTRODUCTION

The history of how people in society have treated disabled children, particularly those with severe problems, is not pleasant. Those obviously abnormal at birth were often left to die. Disabled children who lived had miserable lives and were sometimes hidden away from society. "Misguided family friends and professionals would say, 'put them away and forget them'" (Mulliken & Buckley, 1983, p. 3).

Gradually, the attitude of society toward disabled children changed. A belief in normalization, that is, the right of individuals to live normal lives within the limits of their potential, began to creep into public policy. Eventually, Public Law 94-142, the Education for All Handicapped Children Act of 1975, was passed (Erikson, 1987). With its passage, educators' interest in helping severely handicapped children mounted. According to Public Law 94-142, "children have the right to education, which means the right to be diagnosed and placed properly and instructed appropriately" (Mulliken & Buckley, 1983, p. 12).

One of the most severe and disruptive childhood disorders to be encountered in a school system is autism. An autistic student is defined in the laws of the State of Florida as one who has a disability reflected in severe disorders of communication, behavior

socialization, and academic skills, and whose disability was evident in the early developmental stages of childhood. The student appears to have an impairment of cognitive and perceptual functioning with "limited ability to understand, communicate, learn, and participate in social relationships" (Florida State Board of Education Administrative Rule 6A-6.03023 FAC, p. 324A). Prior to the passage of the Education for All Handicapped Children Act (1975), in the United States, most children with autism were not provided with education in public schools. After the passage of PL 94-142, school districts began to yield to pressures from parents and other advocates and to provide autistic children with educational services. Gradually, a separate category for grouping autistic students was established by educators using a historical medical- and clinical-model orientation (Mesaros & Donnellan, 1987).

Isolating autism as a unitary syndrome is extremely difficult and complex. Currently, there is a multiplicity of diagnostic criteria utilized by medical and educational professionals. This situation has arisen because the characteristics and needs of children diagnosed as autistic are diverse (Koegel, Rincover, & Egel, 1982). Intellectually autistic students range from the severely retarded to those with normal intelligence. They exhibit all levels of adaptive skills. Some autistic students have profound delays in basic self-care. Others are capable of semi-independent living and vocational

self-sufficiency. Autistic students' social functions range from virtual aloneness to important, though peculiar, social relatedness (Cohen & Donnellan, 1987).

The school psychologist is part of a professional team involved with students who are placed in the separate category of autism. As part of a comprehensive evaluation team, the school psychologist might observe the student in the classroom, complete a case history, and administer formal and informal individual tests. "The psychologist is involved as a member of the evaluation team throughout the stages of referral, assessment, placement, and program planning" (Morsink, 1984, p. 76).

The school psychologist has the responsibility of providing essential information that will aid in case management and educational planning with autistic students. Diagnosis is the first step. Assessment then is expanded and enriched as the psychologist examines the strengths and weaknesses of the individual, the learning styles, and the relevant contexts in which the student is functioning. When properly done, the school psychologist's assessment facilitates placement and intervention decisions (Short & Marcus, 1986).

Because school psychologists must examine strengths and weaknesses of individual autistic students during the evaluation process, it is important that they be involved in research regarding those strengths and weaknesses. There is a need for research because

autistic students "have been exposed to a remarkable array of therapies," according to Schopler and Reichler (1971). However, there has been a lack of professional consensus regarding the efficacy of various methods. In order for school psychologists to help plan interventions and therapies, they should know as much as possible about the children placed in this special category.

Statement of the Problem

The program for autistic (profoundly handicapped) students has been given a separate category within the State of Florida since 1979 (P. Hollis, personal communication, April 14, 1988). There is a Florida state definition for inclusion in the program that all school systems follow. Individual districts write district procedures which guide them in program and placement decisions. These decisions are made by committees at the local level. All district procedures must conform with the state definition.

The problem is that there are a number of varying diagnostic criteria and definitions of the autism syndrome (Schopler, Reichler, & Renner, 1986). Because educators are confronted with such varying information, there is confusion and disagreement about how to interpret the state definition for placement of children in an autistic program. Because the state definition is broad, and because autistic students are a very heterogeneous group, there is uncertainty about whether the children placed in autistic programs are really different from the children placed in other programs. For instance,

it is difficult to make decisions regarding placement of trainable mentally handicapped students exhibiting autistic characteristics, because state definitions for these two programs overlap a great deal.

Need for the Study

For more than a quarter of a century, efforts have been made to fit autism into known diagnostic and remedial classifications, according to Fay and Schuler (1980), "but autism simply will not fit" (p. 17). Professionals who have tried to fit autism to a theoretical framework of developmental delay or of mental retardation have found that such an explanation does not account for all of the aberrant verbal behaviors. Fay and Schuler emphasized the complexity of the condition. "Whatever its basis, there is something decidedly language-specific in addition to (causing? resulting from?) the cognitive, emotional, and social shortfalls characteristic of the condition" (p. 17). There is ignorance regarding "complex relationships of language (verbal and nonverbal) to speech, to communication, to cognition, and to the development of the unimpaired personality" (p. 17).

Answers are needed to a number of questions. Why are some children with intellectual ability between three and five standard deviations below the mean placed in autistic (profoundly handicapped) programs and other children with the same intellectual level placed in trainable mentally handicapped programs? Are the children truly

different? Do the Florida definitions for autism and for trainable mentally handicapped define two separate groups?

The Florida definition for mentally handicapped students states that these students are significantly impaired in general intellectual functioning concurrent with deficits in adaptive behavior. This must have been manifested during the developmental period (Florida State Board of Education Administrative Rule 6A-6.03011, FAC). Trainable mentally handicapped students are those whose intellectual level is three to five standard deviations below the mean (Florida State Board of Education Administrative Rule 6A-6.03011 [1] [a]-[b], FAC).

The Florida definition for autistic students states that they have a disability reflected in severe disorders of communication, behavior socialization and academic skills. Their disabilities must also have been evident in the early developmental stages. The autistic child has a pervasive impairment of cognition and perceptual functioning (Florida State Board of Education Administrative Rule 6A-6.03023 FAC).

Many autistic students' cognitive impairments cause them to obtain measured intelligence quotients (IQs) in the same range as the trainable students. Autistic students, by definition, have severe disorders of behavior socialization. Trainable students, by definition, have deficits in adaptive behavior, which includes socialization. A trainable student with low cognitive functioning

often exhibits a severe disorder of communication, which is part of the definition of an autistic child. A trainable child may also exhibit behavior problems. Both groups, trainable mentally handicapped and those autistic students with low intellectual ability, exhibit deficits in academic skills.

The overlap between the two groups is obvious, yet Florida has two separate categories for their education. Are there some characteristics of these children that are significantly different which delineate their separate classifications? Are there some things about the students in the two groups which educators need to know so that interventions can be planned? Is there really a difference between the children in these two programs when you remove the autistic students with higher intellectual ability from consideration?

Do low IQ autistic children in Florida programs have observable behaviors that distinguish them from trainable children? There has been some agreement through the years concerning the observable behaviors which are characteristic of autistic children. Kanner (1943), the British Working Party (Creak, 1964), Rutter (1978), the National Society for Autistic Children (1978), and the American Psychological Association's DSM-III-R (1987) all have similar diagnostic criteria for autism. Do children with low intellectual ability placed in autistic programs based on the Florida definition exhibit these characteristics more than children of low IQ placed in trainable programs?

Deficits in imitation have been demonstrated in autistic children in past research. Koegel and Schreibman (1982) stated that "autistic and other severely handicapped children typically fail to imitate and do not benefit from this important source of learning" (p. 41). How do children with intellectual ability in the trainable range who are in autistic programs in Florida compare with children in trainable programs in Florida in the ability to imitate, vocally and gesturally?

Object permanence, an important early developmental concept, is crucial for further cognitive growth. It is usually acquired by age two (Flavell, 1985). Previous research on the object concept in autistic children has yielded varying results. Most of the research indicated that autistic children do achieve the concept of object permanence. However, when researchers have tested this theory, they have usually included autistic children with varying levels of intellectual ability (Cowan, 1978; Curcio, 1978; Hammes & Langdell, 1981; Lancy & Goldstein, 1982; Serafica, 1971; Sigman & Ungerer, 1981; Sigman, Ungerer, Mundy, & Sherman, 1987; Thatcher, 1977). When only those autistic children with retardation in the trainable range are compared to children in the trainable program on object permanence, are they the same or are they different? Do low IQ autistic children achieve object permanence as well as or better than trainable children?

This study was an effort to learn more about children who usually do not function within normal expectations. Once answers to these questions have been obtained, it will be possible to plan activities and intervention strategies for autistic children that will "facilitate cognitive growth in terms of movement from a lower to a higher level of functioning within particular domains" (Dunst, 1980, p. 7).

Theoretical Explanations of Autism

Various cognitive theories are useful in studying autism. Until the 1970s, autism was regarded as a psychogenic emotional disorder with secondary cognitive involvement. At the present time, a theory of cognitive development is considered the base. There is increasing evidence that autism is biogenic rather than psychogenic, that it is more closely associated with organic than psychosocial variables, and that it is now seen "more as a developmental than an emotional disorder" (Morgan, 1984, p. 215). According to Morgan, research findings have suggested that cognitive impairment "represents the primary psychological defect in autism, to which the emotional and social symptoms are secondary" (p. 216).

There have been proposals that autism is a sensorimotor disorder with the problems in sensorimotor integration more basic than the cognitive disturbances that appear later (Morgan, 1984). Other researchers have suggested that autism is a perceptual-cognitive

disorder in which new stimuli are not tied to remembered experience. Some theorists have stated that autism is a cognitive-language disorder with severe and pervasive impairment of language and symbolic thought, both higher cognitive functions.

In summary, most theorists seem to concur that autism results from impairment of congitive-developmental processes. Morgan (1984) stated that researchers agree that "autism represents an impairment along the cognitive-developmental dimension, but differ in their hypotheses regarding the basic functions involved" (p. 226). He added that though they share the premise that "some deficient cognitive structure plays a primary role in autism, they have no common set of terms or theoretical base" (p. 226). Morgan suggested that all the mentioned explanations of autism are consistent with a developmental, structural model and that Piaget's more comprehensive theoretical views could encompass them all.

A cognitive-developmental theory is also appropriate when studying trainable mentally handicapped students. Most researchers who have conducted studies of such children have indicated that these children demonstrate that they develop cognitively in the same manner as normal children. However, they develop at a slower rate and with a lower ceiling than do normal children (Inhelder, 1968; Stephens & McLaughlin, 1974; Woodward, 1961, 1962).

Piaget's theory has been considered appropriate for use in studying the development of both autistic and trainable mentally

handicapped children. McFarland and Grant (1982) observed that the holistic and interdisciplinary approach of Piagetian theory offers a "point of departure where we may raise questions of learning and development" (p. 392). They stated that Piagetian theory exemplifies an organismic, developmental model. As a structural-theoretical model it has "methodological implications for the description, explanation, and modification of children" (p. 393).

This study was an attempt to differentiate between two groups of handicapped children. Piaget's theory which helps clarify differences is, therefore, appropriate.

Purpose of the Study

The purpose of this study was to test the hypotheses that there were no significant differences in development of object permanence, development of vocal and gestural imitation, and possession of the characteristics usually associated with autism between a group of pupils classified as autistic with intellectual ability in the trainable range and a group classified as trainable mentally handicapped. Whether or not the autistic students were different in their abilities to imitate vocally and their abilities to imitate gesturally was also part of the purpose. This was also investigated for the trainable students.

Rationale

Kistner and Robbins (1986) examined a subset of studies on autism published between 1971 and 1982. They concluded that subject

selection procedures were often inadequate and important descriptive information was omitted, impairing replicability of research and appropriate generalization of findings. They proposed that future research should clearly delineate the diagnostic criteria used. They suggested that children's performance on standardized measures of intelligence should be included in a description of subjects, emphasizing the need to "match autistic and nonautistic groups for mental age, chronological age, and/or some specific characteristics or behavior in order to draw conclusions that are specific to autism" (p. 82).

Hermelin and O'Connor (1970) noted that because most autistic children function at severely subnormal levels, much of their behavior might be explained by their low intelligence. They suggested that an attempt to control for intellectual level would make it possible to attribute any behavior which distinguished autistic children from mentally defective children specifically to autism.

In the present study, the selected children were matched as Kistner and Robbins suggested. Matching was based on gender, chronological age, and intellectual level (three to five standard deviations below the mean). Gender was chosen for a matching variable, because 75% of autistic persons are males. Chronological age was matched within six months. Intellectual level was matched within a range rather than by computing a specific mental age. The

students in the study were those in two specific programs, but anyone wishing to replicate this study could use the Childhood Autism Rating Scale to verify whether or not the subjects exhibit the characteristics usually associated with autism.

The instruments chosen for the study were flexible and appealing, according to their authors, and appeared to be ones which would be possible to administer to autistic children. According to Shah and Holmes (1985), autistic children are no longer considered "untestable" on standardized measures. However, they are sometimes very difficult to assess. Their severe communication problems may prevent them from understanding the complicated requirements of a test (following directions). Also, their impairments in social interaction make it difficult to establish good rapport, and they are often unmotivated or preoccupied with stereotyped activities that interfere with the scoring of timed tests.

The sensorimotor domains of imitation and object permanence were measured by the Uzgiris and Hunt Scales of Infant Psychological Development. Imitation was further investigated by using the Imitation scales of the Psychological Profile (PEP) and the Sentence Imitation subtest of the Test of Language Development-Primary (TOLD-P). The behaviors of the autistic and trainable children were compared by rating them on the Childhood Autism Rating Scale (CARS) for Diagnostic Screening and Classification of Autism.

Hypotheses

1. There are no differences in performance between autistic children and trainable mentally handicapped children on the Visual Pursuit and Permanence of Objects scale of the Uzgiris and Hunt Scales of Infant Psychological Development.

2. There are no differences in performance between autistic children and trainable mentally handicapped children on the Development of Vocal Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development.

3. There are no differences in performance between autistic children and trainable mentally handicapped children on the Development of Gestural Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development.

4. There are no differences in performance between autistic children and trainable mentally handicapped children on the Imitation scale of the Psychoeducational Profile.

5. There are no differences in performance between autistic children and trainable mentally handicapped children on the Sentence Imitation scale of the Test of Language Development-Primary.

6. There are no differences in performance between autistic children and trainable mentally handicapped children on behavioral characteristics in the Childhood Autism Rating Scale.

7. There are no differences between performance on the Development of Vocal Imitation scale and the Development of Gestural

Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development for autistic children.

8. There are no differences between performance on the Development of Vocal Imitation scale and the Development of Gestural Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development for trainable mentally handicapped children.

Definition of Terms

An autistic (profoundly handicapped) student is one who has a disability reflected in severe disorders of communication, behavior socialization, and academic skills, and whose disability was evident in the early developmental stages of childhood. "The autistic child appears to suffer primarily from a pervasive impairment of cognitive and perceptual functioning, the consequences of which are manifested by limited ability to understand, communicate, learn, and participate in social relationships" (Florida State Board of Education Adminstrative Rule 6A-6.03023 FAC, p. 324A).

Bizarre behavior refers to stereotyped, repetitive self-stimulatory behavior; inappropriate and repetitive play behavior; and obsessive ritualistic behavior resisting change. Self-stimulatory behaviors seem to serve the purpose of providing sensory input. Examples are manipulating hands or fingers in front of eyes; eye crossing; repetitive, meaningless vocalizations; suspending or spinning objects in front of eyes; mouthing objects; tapping hand;

and rocking the body. In play, the bizarre behavior includes forsaking toys to spin a household object or flick a light switch or interacting with toys in an abnormal manner, such as stacking, arranging, or sorting repetitively. Obsessive, ritualistic behaviors might include a profound resistance to change in environment or routine (Koegel et al., 1982).

Delayed echolalia is the repetition in a seemingly irrelevant situation of a phrase a person has heard at one time or another. It may be a saying or proverb, television commercial, song title, or a sentence spoken by someone in his or her presence (Morgan, 1981).

Echolalia is the apparently noncommunicative repetition of a word or utterance spoken by another person. It is a common phenomenon in normal language development (Howlin, 1982).

Gestural imitation consists of demonstrating gestures while the child is attentive and observing whether the child imitates them. Some are visible to the child when repeated. Others, like wrinkling the nose, are invisible to the child (Uzgiris & Hunt, 1975).

The individualized education program (IEP) is a written individualized plan for each handicapped child. It must be written before placement and reviewed at least once each year. It sets forth the special education and related services needed. Emphasis is on involving parents in the writing of the IEP (Mulliken & Buckley, 1983).

A mentally retarded student in the State of Florida is one who is significantly impaired in general intellectual functioning concurrent with deficits in adaptive behavior which are manifested during the developmental period (Florida State Board of Education Administrative Rule 6A-6.03011, FAC). The term "mentally handicapped" is used interchangeably with the term "mentally retarded."

Object permanence is the ability to see an object as an entity in its own right. The object exists and moves in a space common to it and the subject seeing it. The object's continued existence is construed as independent of the activity the subject may apply to it and separate from the subject. Object permanence recognizes "that the self is also one object among other objects" (Serafica, 1971, p. 473).

In 1975, amendments to the Education of the Handicapped Act were passed as Public Law 94-142. The amendments were known as the Education for All Handicapped Children Act. The law provided broad directives in what constitutes free appropriate education, least restrictive environment, nonbiased evaluations and placement, individualized education program (IEP), confidential records and freedom of access to them, appropriate discipline, related services, and parental rights and responsibilities (including due process) (Mulliken & Buckley, 1983).

Sensorimotor development, according to Piaget (1936), is the development in a normal child from birth to the ages of 1 1/2 years to

2 years. The child progresses through six substages of sensorimotor intelligence. In the earliest period, the child is reflexive (looking, sucking, prehension). In the final period, the child can imitate an absent model, search for and find a hidden object, and show a great deal of evidence of internal mental activity. The child realizes that objects no longer in the here-and-now continue to exist, but appreciation of them is tied to concrete action (Athey & Rubadeau, 1970).

Syntax refers to the skills used in forming and understanding sentences. It has to do with sentence structure, or the correct sequencing of words and inflections to form sentences (Newcomer & Hammill, 1982).

A trainable mentally retarded student is one whose intellectual ability falls in the moderate or severe ranges of retardation of the American Association of Mental Retardation (Grossman, 1983). Adaptive behavior falls below age and cultural expectations (Florida State Board of Education Administrative Rule 6A-6.03011 [1] [a]-[b], FAC).

Vocal imitation ranges from differentiation in vocal productions through development in imitation of sound patterns. The final step is vocalization of unfamiliar words (Uzgiris & Hunt, 1975).

Overview

Chapter II is a review of related literature which supports and expands on elements in Chapter I. More complete definitions of

autistic and trainable mentally handicapped children are presented. There is information from the literature on the characteristics of both the autistic child and the trainable mentally handicapped child. Piaget's theory is expanded, and the prevalence of autistic children and trainable mentally handicapped children is considered. There is further consideration of the variables investigated in the study. Object permanence, imitation, and the behaviors measured by the CARS are discussed. Finally, the instruments used in the study are evaluated and their reliabilities, validities, and appropriateness are discussed.

Chapter III consists of a description of the methodology chosen and its limitations. In Chapter IV, results of the analysis of the data are presented. Tables of summary data are included. Chapter V contains a discussion of results, limitations, conclusions, and implications for education and further research. Also, a summation of findings is included.

CHAPTER II
REVIEW OF THE LITERATURE

For a number of reasons, it is important to study the developmental characteristics and behavioral characteristics of children placed in autistic programs. It is also important to compare them with children within the same intellectual range who remain in programs for the mentally retarded. There is a need to know in what areas these two groups of children are alike and in what areas they are different. There are implications for the individual education programs of children who are being referred and of those for whom placement decisions are being made. It is important to consider research which has already been done regarding both groups.

In a review of the literature, terms are defined, concepts clarified, and the decisions made in designing the study are explained. Light is shed on the purpose and the need for the study. The definitions for autistic (profoundly handicapped) and trainable mentally handicapped students from the Florida State Board of Education Administrative Rules were stated in Chapter I in the Definition of Terms section. Further information, including diagnostic criteria, characteristics, developmental sequence, prevalence, variables, and the instruments that were used, is included in this chapter.

Diagnostic Criteria

Autism

The most widely used set of diagnostic criteria for autism in the United States has been the definition for autistic disorder in the Diagnostic and Statistical Manual of Mental Disorders (3rd ed.) of the American Psychiatric Association (1980). That definition was revised in the Diagnostic and Statistical Manual of Mental Disorders (3rd ed., rev.) (DSM-III-R) (American Psychiatric Association, 1987). Autism is classified in DSM-III-R (1987) as a pervasive developmental disorder. The new definition is considered here.

Eight of 16 specified items must be present for a diagnosis of autistic disorder. Two must be from features listed under qualitative impairment in reciprocal social interaction. They are

1. marked lack of awareness of the existence or feelings of others . . .
2. no or abnormal seeking of comfort at times of distress . . .
3. no or impaired imitation . . .
4. no or abnormal social play . . .
5. gross impairment in ability to make peer friendships. (American Psychiatric Association, 1987, p. 38)

One item must be present from a list of qualitative impairments in verbal and nonverbal communication and in imaginative activity. The list includes the following:

1. no mode of communication . . .
2. markedly abnormal nonverbal communication, as in the use of eye-to-eye gaze, facial expression, body posture, or gestures to initiate or modulate social interaction . . .

3. absence of imaginative activity . . .
4. marked abnormalities in the production of speech . . .
5. marked abnormalities in the form or content of speech, including stereotyped and repetitive use of speech . . .
6. marked impairment in the ability to initiate or sustain a conversation with others, despite adequate speech. (pp. 38-39)

Onset is during infancy or childhood. Childhood onset is that which occurs after 36 months of age and should be specified as noted.

The State of Florida definition of an autistic (profoundly handicapped) student is consistent with the DSM-III-R (American Psychiatric Association, 1987) diagnostic criteria. A severe disorder of behavior socialization is required. This is equivalent to the qualitative impairment in reciprocal social interaction and restricted repertoire of activities and interests of DSM-III-R.

In the Florida definition, a severe disorder of communication is required. This is consistent with the requirement of a qualitative impairment in verbal and nonverbal communication in DSM-III-R.

The Florida definition of an autistic child also includes a severe disorder in academic skills manifested by limited ability to learn. The disorder must be affecting learning and interfering with the student's ability to gain academic skills (Florida State Board of Education Administrative Rule 6A-6.03023 FAC).

Trainable Mental Handicap

The most widely used diagnostic criteria of mental retardation or mental handicap were suggested by the American Association of Mental

Retardation (AAMR) (Grossman, 1983). The AAMR definition was stated as follows: "mental retardation refers to significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior, and manifested during the developmental period" (Grossman, 1983, p. 1). Diagnosis does not refer to etiology, but refers to level of behavioral performance (Sattler, 1982). According to the AAMR, persons cannot be considered mentally retarded unless they fall into the retarded category "in both intellectual functioning and adaptive behavior functioning" (Sattler, 1982, p. 425). Criteria for the diagnosis of trainable mentally handicapped focus on present behavior.

The definition of mental retardation adopted by the American Psychiatric Association (1987) is in basic agreement with the definition by the American Association of Mental Retardation (Grossman, 1983). In the Diagnostic and Statistical Manual of Mental Disorders (Third Edition-Revised) of the American Psychiatric Association (1987), it was stated that the essential feature of mental retardation is general intellectual functioning that is significantly subaverage. It results in, or is associated with, deficits or impairments in adaptive behavior. Onset is before the age of 18.

Significantly subaverage intellectual functioning is defined as an intelligence quotient of 70 or below obtained by assessment on an individually administered general intelligence test. In DSM-III-R

(American Psychiatric Association, 1987) the degrees of severity of mental retardation were listed. An IQ level from 50-55 to approximately 70 is considered mild. Of particular interest to this study were the subtypes considered moderate and severe. Moderate retardation has an IQ level from 35-40 to 50-55 and severe is from 20-25 to 35-40.

Characteristics of Autistic and Trainable Mentally Handicapped Children

Autistic Characteristics

When Kanner (1943) first described autism in the literature, he saw early infantile autism as the earliest manifestation of childhood schizophrenia. The common characteristics he noted were "profound withdrawal, an obsessive desire for sameness, a skillful and even affectionate relation to objects, an intelligent and pensive physiognomy, and either mutism or the kind of language that does not serve interpersonal communication" (Fay & Schuler, 1980, p. 3). Kanner (1943) believed autistic children were the product of a parent type characterized as cold, intellectual, ego-oriented, driving, and ambitious. His original definition considered the affective withdrawal from emotional contact and the obsessive preoccupation with sameness primary features. Delayed or disordered speech were considered secondary to the emotional disturbance. Despite delays in adaptive and cognitive skills, Kanner did not believe autistic children suffered from mental retardation. Because of the presence of

peak skills, particularly in visual memory, he believed autistic children had normal intellectual potential (Short & Marcus, 1986).

It is now believed that fewer than 5% of autistic individuals can be considered to have average or above average ability in all areas (DeMyer, 1979); 75% to 80% have some degree of retardation. Most of these have moderate to severe delays (DeMyer, Hingtgen, & Jackson, 1981; Schopler, 1983).

Short and Marcus (1986) stated that the main characteristic of autistic persons is unevenness of development. "Certain nonverbal skills, such as visual spatial, visual memory, and gross motor abilities are more intact than language, complex problem solving, and sequential processing" (Short & Marcus, 1986, p. 158). Fluctuations and irregularities in rates of learning over periods of time are also an aspect of this learning disorder.

Another shift since Kanner (1943) first described autism is an abandonment of his idea of the cold parent. In 1964, Rimland published his book, Infantile Autism, in which a genetic-cognitive orientation replaced Kanner's approach. He theorized that an autistic child has difficulty relating present sensation to past experience. This causes the child's inability to understand relationships or think abstractly. Rimland felt such a child, being unable to integrate sensations into a comprehensive whole, would not be able to perceive oneself as an organized and unitary entity. More than 400 articles and

six books were published between Rimland's work in 1964 and 1969. The relative importance of disorder in language was stressed. Also, parents have now been exonerated (Fay & Schuler, 1980). Autism was once considered a problem for high socioeconomic (SES) families only. Now autism has been found to span all SES levels (Gillberg & Schaumann, 1982; Schopler, Andrews, & Strupp, 1979; Tsai, Stewart, Faust, & Shook, 1982).

Autistic children were pooled with schizophrenic children until 1980, when the Federal Bureau of Education for the Handicapped recognized autism as a developmental disability distinct from schizophrenia. Autism then became seen as a separate disorder by the educational and psychological community (Wulff, 1985).

There are many findings to support the fact that autism is biogenic rather than psychogenic. Twin studies that were conducted have provided data that supported this idea. Researchers have conducted studies providing confirmation of the hypothesis that it is with low-functioning autistic children that a familial genetic component exists. The "transmitted factor may pertain to a more general cognitive impairment" (Baird & August, 1985, p. 320).

Some researchers have shown that autism can arise from many diverse neuro-pathological conditions. Recently, studies have been reported indicating more signs of neurological dysfunction in children with autism. The number of children diagnosed as autistic who have abnormal EEGs is now seen as significantly higher than once thought.

> The most plausible conclusion that we can draw from the available evidence is that autism is the behavioral end-product of an underlying organic defect (or combination of defects) that may arise in different ways through a variety of possible causal agents. (Morgan, 1986, p. 6)

Despite the small percentage of the population considered autistic, the extent of the problem is great, for at this time there is a relatively poor prognosis. "The current outlook for autistic children as adults is generally poor" (Morgan, 1986, p. 7). Morgan cited Lotter's (1978) review of follow-up studies on autistic children which reported that only 5% to 17% achieved outcomes considered good with near normal social life, and satisfactory school and work performance, while 61% to 74% had very poor outcomes and were incapable of leading independent lives.

The characteristics of autism can go hand in hand with visual or hearing impairments, seizure disorders, motor handicaps, and such syndromes as tuberous sclerosis and congenital rubella. When autism is paired with additional handicaps, the prognosis is even poorer (Olley & Marcus, 1984).

Trainable Mentally Handicapped Characteristics

Students labeled retarded do not form a homogeneous group. There are two main classes within the category. One class is called the familial type. These are usually those with milder retardation. They are the individuals who fall in the lower portion of the normal distribution of intelligence. "As such, their performance reflects normal intellectual variability" (Sattler, 1982, p. 427). This

variability can be the result of normal polygenic variation. It is the combined action of many genes. It can be the combination of "below-average heredity in interaction with a markedly below-average environment" (p. 427).

Most trainable mentally handicapped students are in the second class. This is the organic type of mental retardation. It is associated with either a genetic component linked to single gene effects, chromosomal abnormalities, or brain damage or malformations" which originate during the prenatal period (Sattler, 1982, p. 427). They have a severe lag in behavioral development with sometimes an abnormal appearance. They fail to reach normal motor and language developmental milestones.

"Retardation may result from genetic (endogenous) or external (exogenous) causes" (Schwartz, 1979, p. 23). Endogenous causes might be a single dominant gene that appears in more than one generation of a family, a genetic mutation that is specific to one pregnancy, or a matching of two recessive genes when conception takes place. Examples of exogenous causes are use of drugs, toxemia of pregnancy, or rubella in the mother-to-be. These are all prenatal. An exogenous cause at birth might be anoxia (lack of oxygen). Postnatal exogenous causes could be illnesses or injuries that affect brain functioning or extremely inadequate nutrition (Schwartz, 1979).

Piaget's Theory of Human Development

Piaget (1936, 1937, 1945) saw human cognition as a form of biological adaptation by a complex organism to a complex environment. He saw it as extremely active. It selects and interprets environmental information in constructing its own knowledge. It does not passively copy the information as it is presented to the senses. The Piagetian mind reconstructs and reinterprets the environment as it makes it fit in with the existing mental framework. It does not copy the world (passively accepting it) and it does not ignore the world. The mind builds knowledge structures by taking external data. It interprets the data, transforms them, and reorganizes them. The mind meets the environment in an active, self-directed way (Flavell, 1985).

Cognition has two simultaneous and complementary aspects of adaptation: assimilation and accommodation. Assimilation is integrating new perceptual, motor, or conceptual matter into existing patterns of behavior or schemata. Accommodation is creating new schema or modifying existing schema so that a new stimulus will fit into it (Wadsworth, 1984). Wadsworth stated that

> Piaget's system requires that a child act in the environment if cognitive development is to proceed. The development of cognitive structures is ensured only if the child assimilates and accommodates stimuli in the environment. This can happen only if the child's senses are brought to bear on the environment. (p. 21)

The child moves in space, manipulates objects, searches with eyes and ears, thinks, and takes in the raw ingredients that are to be assimilated and accommodated. This results in the development of schemata.

Piaget asserted that there is a developmental process of successive qualitative changes. It is a continuous process along a continuum. The chronological ages at which children reach a certain stage, though suggested, are not fixed. There is a general internal monitoring system known as equilibration. This "allows new experience to be successfully incorporated into schemata" (Wadsworth, 1984, p. 32).

Piaget (1936, 1937) outlined four periods of cognitive development: sensorimotor period (first 2 years), preoperational period (2 to 7 years), concrete operational period (7 to 11 years), and formal operational period (11 years onward).

This research focused on the sensorimotor period. It consists of six states. They are

1. Stage I (0-1 month), which is characterized by gross, uncoordinated body movements and neonatal reflexes. It is a time of complete egocentrism. There is no distinction between self and outer reality. There is no clear awareness of self.

2. Stage II (1-4 months), in which new response patterns are formed by chance. Combinations of primitive reflexes are formed.

3. Stage III (4-8 months), when the new response patterns are coordinated and intentionally repeated to maintain interesting environmental changes.

4. Stage IV (8-12 months), which consists of more complex coordinations of earlier behavior patterns. These are both motor and perceptual.

5. Stage V (12-18 months), when familiar patterns are varied to obtain different results, direct groping emerges, and new means-end manipulations emerge.

6. Stage VI (18-24 months) in which there is internalization of sensorimotor behavior patterns. Symbolic representation begins. Rather than external trial and error, there is invention of new means through experimentation (Pulaski, 1971).

Piaget's second period, which follows sensorimotor, is the preoperational period. Usually found in 2 to 7 year old children, it is a time of improved strategies for processing information. The child can perform simple actions and gain practical knowledge. Language acquisition flourishes and the child explores the environment. The third period is concrete operations, from 7 to 11 years. The person becomes less egocentric and begins dealing with more than one variable at a time. Thinking becomes more logical and efficient, but the child is not a proficient, abstract thinker.

Formal operations, Piaget's final period, from 11 years on in normal individuals, consists of improvement in abstract thinking, hypothesizing, and imagining. The child is no longer tied to the concrete as one was during the concrete operational period (Fromanek & Gurian, 1981).

Prevalence of Autism and Trainable Mental Handicap

Autism Prevalence

The problem of autism is restricted to a small percentage of the population, but it is devastating in its impact. Previously, researchers suggested that the incidence of autism was 4 or 5 per 10,000. A study conducted in England in 1964 of 8, 9, and 10 year old children and a study conducted in Denmark corroborated this prevalence figure (Wing, 1972). According to Wing, autism occurs about as often as total deafness and more often than total blindness. She stated that "most people will meet at least one autistic child at some time or another in their lives" (p. 10).

Short and Marcus (1986) claimed that "more recent epidemiologic surveys indicate an incident rate closer to 15 per 10,000" (p. 158). This latter number more clearly approximates the proportion of the typical school population considered autistic. Some of these students are mentally retarded with autistic characteristics and they would have been excluded by Kanner's definition.

Using the 1980 general population of 222 million persons in the United States, this would amount to the following number of autistic

individuals: an incidence of 4 per 10,000 would be 88,800 and an incidence of 15 per 10,000 would be 333,000.

Trainable Mental Handicap Prevalence

Disagreements exist as to the prevalence of mental retardation in the United States. Estimates range from .05% to 13% of the population. The generally accepted rule of thumb is 3%. This estimate approximates the number of persons who would have IQs two or more standard deviations below the mean. "Using calculations similar to the ones presented by Dingman and Tarjan (1960) with adjustments based on a 1980 general population of 222 million people, it is estimated that there are 7,247,940 mentally retarded individuals in the United States" (Matson & Bruening, 1983, p. 92).

According to Sattler (1988), approximately 0.3% of the total population are in the trainable range of retardation. This includes moderately and severely retarded. According to DSM-III-R (American Psychiatric Association, 1987), it was stated that results of recent studies have suggested that the prevalence rate of mental retardation at any one time is 1%. Of the retarded population, 10% are moderately retarded, and 3% to 4% of the retarded are severely retarded. Cegelka and Prehm (1982) also stated that 1% of the population are found to be retarded when both low measured intelligence and poor adaptive behavior are considered in the diagnosis.

The variation in prevalence can be accounted for, in part, by the failure to differentiate incidence from prevalence of mental retardation, according to MacMillan (1977). The first is the number of retarded at some time in life. The latter is the number of retarded at any one time. Though 3% of the population may have been diagnosed as retarded at some time, no more than 1% are diagnosed as such at any given time (Cegelka & Prehm, 1982).

Variables

The Object Permanence Variable

Object permanence was the first variable investigated in this study. The Piagetian concept of object permanence is the implicit, common sense belief that all objects (and beings) are physical objects in a common space, and that fellow objects continue to exist and may move about in space even when one has lost perceptual contact with them. This fundamental and "obvious" conception of objects seems to require nearly the whole first two years of life. Flavell (1985) discussed the different stages in his book on cognitive development.

In stage I and II (approximately 0 to 4 months), a baby will track a moving object until it disappears. Then the baby will lose interest or stare briefly at the point of disappearance.

In stage III (about 4 to 8 months), the baby can extrapolate from the object's movement and lean over and look for a fallen object. The baby can also recognize an object by seeing part of it, but will not retrieve it if it completely disappears behind a screen.

In stage IV (8 to 12 months), the baby will manually retrieve a covered up object. However, after a few trials with the object beneath the same screen, the infant will continue to look there even though the object has been seen to be put under a different one.

Stage V (12 to 18 months), is more advanced and the youngster searches where the object was seen to disappear.

In stage VI (18 to 24 months), the child can use newly developed symbolic skills to represent possible invisible displacements rather than only visible displacements or what was seen.

Most investigators agree with Piaget that children lack the object concept at birth and must acquire it, usually by age two (Flavell, 1985).

Research conducted on object permanence in autistic children has provided varying results. Early studies did not distinguish between schizophrenic and autistic children. Children in this category were said to "consistently show structural retardation in at least four important conceptual schemes or abilities. Object permanence was one of them (Cowan, 1978, p. 335). Serafica (1971) found that some of the 4- to 8-year-old schizophrenic children in his study failed to reach beginning object permanence on the Uzgiris and Hunt Scales. Some did reach stage V and others stage VI (the highest stage). Those who reached VI did so only with familiar objects. Cowan (1978) questioned whether these children would eventually emerge from the sensorimotor

stage or not. Morgan (1984) asked whether autistic children remain at the sensorimotor level and "fail to acquire the symbolic codes necessary for progressive socialization" (p. 229).

Thatcher (1977) found that there was no statistical difference between the 10 autistic students she tested using the Visual Pursuits and Permanence of Objects subtest of the Uzgiris and Hunt Scales and what would be expected at their age for normal children. She believed that autistic children above age 4 have developed object permanence. However, her study gave no mental age or IQ for half of her subjects and it is possible that some of the children in her study had a relatively high cognitive levels.

Curcio (1978) conducted an assessment of 12 autistic children, ages 4 through 12 years on object permanence tasks. The majority performed above stage V.

In two more recent studies, autistic subjects were found to have achieved object permanence. Hammes and Langdell (1981) compared eight autistic and eight mentally retarded students using a disappearing train task. They inferred that their subjects had the concept of object permanence. Sigman and Ungerer (1981) compared 16 autistic with 16 mentally retarded and 16 normal children. Their subjects were young, age 3 through 6 years, but they all achieved stage VI on object permanence using the Casati-Lezine (1968) Scale. The fact that the autistic, the mentally retarded, and the normal children all performed

almost identically suggested that autistic children do not have a specific deficiency in object permanence (Sigman et al., 1987).

Lancy and Goldstein (1982) compared the object permanence abilities of 12 autistic, 12 mentally retarded, and 12 normal children, ages 4 through 9, using a hidden food reward. All 12 of the autistic students were successful in finding the hidden food.

In most of the studies cited above, researchers indicated that the autistic students participating in these studies did achieve the concept of object permanence. However, these studies were not limited to autistic students with low cognitive ability. Their achievement of the object concept may be a reflection of higher general cognitive ability.

The Imitation Variable

Imitation is the second variable investigated in this study. The ability to imitate is an important developmental landmark. It is a prerequisite for the acquisition of subsequent symbolic activities. According to Bayley (1969), in normal youngsters the acquisition of imitative skills follows a characteristic course. Children imitate a smile at an average age of 2.1 months. They imitate simple social games at 9.7 months, simple gestures at 15 months, and block constructions at 16.7 months. In imitation, the child must both recollect the stimulus and transfer it into motor activity.

Imitation is one of the most frequent routes of learning in normal children. It allows the child to reproduce an action of another person. The child must internalize a representation of the action. Autistic children rarely imitate spontaneously. It is unclear whether they are unable or reluctant to do so. Some imitation can be observed in both body movements and speech. Particularly, some autistic children engage in echolalia (Sigman et al., 1987). Yet Koegel and Schreibman (1982) stated that "autistic and other severely handicapped children typically fail to imitate and do not benefit from this important source of learning" (p. 41).

Many autistic children engage in echolalia. Echolalia, the apparently noncommunicative repetition of an utterance or word spoken by someone else, is common among children whose language is developing normally. Some produce words echolalically from 9 or 10 months onward. At about age 2 or 3 years, when phrase speech is developing, many children frequently echo the last words of what is said to them. Echolalia may play an important role in the development of vocabulary and the consolidation of language skills. It may perform a variety of different and important functions in the growth of linguistic competence in normal children (Howlin, 1982).

Echolalia is found to be the most often cited characteristic of autistic children who acquire speech (Prizant, 1983). There is sometimes a progressive change in echolalic utterances leading to a more rule-governed linguistic behavior (Prizant & Schuler, 1987).

There may be a qualitative difference between autistic and normal echolalia, but no clearcut criteria have been developed to differentiate between them (Schuler, 1979). Some of the specific constructions which first appear in echolalia, are then used in both echolalia and spontaneous speech (Howlin, 1982). This may sometimes occur, but it is not always the case. Paul (1987) claimed that "although echolalia often appears to be an intermediate step toward more functional language, in many autistic individuals it can continue into adulthood" (p. 74).

DeMyer, Barton, and Norton (1972) and DeMyer (1972) conducted several studies on the motor performance of autistic children. They found autistic children to be below the level of subnormal children on motor imitation tasks. They were particularly poor in body imitation tasks. An unpublished study by Van Smeerdjik (1981) found the imitation skills to be consistent with their mental age. Hammes and Langdell (1981) reported that autistic children were able to imitate at a basic level and to demonstrate deferred imitation in a study they conducted requiring imitation using objects.

Jones and Prior (1985) found that "autistic children have significant handicaps in the neuro-developmental area" (p. 42). Body imitation ability was impaired for both dynamic movement and gesture when compared to both mental age matched and significantly younger children. Performance of older children in the study suggested that

many have little further development than that found in 2 to 3 year olds. DeMyer et al. (1981) have suggested, and Jones and Prior (1985) agreed, that the poor ability autistic children have to perform motor imitation tasks may be due to motor dyspraxia.

Thatcher (1977) used the Vocal and Gestural Imitation subtests from the Uzgiris and Hunt Scales with autistic children. She found that though there were some differences between the expected and obtained stages, these differences were not significantly different from results expected of the normal population. Thatcher's study had 10 subjects ranging in age from 50 to 173 months. It should be noted that her three youngest subjects made no scorable responses on either the vocal or gestural subtests.

Kahn (1983) found that the Vocal Imitation scale of the Uzgiris and Hunt could be used to predict the Language domain of the American Association of Mental Deficiency Adaptive Behavior Scale (ABS) and the expressive portion of the Receptive-Expressive Emergent Language Scale (REEL). The Uzgiris and Hunt Vocal Imitation scale also contributed significantly to the Independent Functioning scale of the ABS. According to the researcher, imitation is the "Piagetian example of pure accommodation" and the acquisition of independent functioning "requires individuals to adapt to the environment" (pp. 74-75).

Volkmar (1987) stated that attempts to teach imitation skills to autistic children have been common. Valcante (1986) believed that

"awareness of student imitative abilities will hopefully lead to more effective instructional planning in the future" (p. 133). If that planning includes teaching autistic children to imitate, Koegel and Schreibman (1982) stated it will "facilitate widespread behavior change. Training autistic children to learn by observing the behavior of others holds great promise" (p. 41).

The Behavioral Characteristics Variables

A number of behaviors usually associated with autism are used as variables in this study. The first is the child's ability to relate to people. Volkmar (1987) stated that young autistic children are not interested in the human face or social interaction. They do not develop social attachments as expected, although they may have unusual and idiosyncratic attachments to objects. Autistic youngsters may ignore people or seem hard to reach. Social relationships may fail to develop or the quality of their development may be aberrant.

Imitation deficits, as mentioned earlier, have been demonstrated in autistic children (Volkmar, 1987). They typically do best in response to tasks requiring object manipulation and worse in response to tasks which require them to imitate actions.

The emotional response of autistic children is atypical. They may "feel at the mercy of powerful affects, which they experience as profoundly disorganizing and threatening" (Provence & Dahl, 1987, p. 682). Many have massive and pervasive anxiety which reflects the

persistent possibility of ego disorganization. Some of the autistic children's bizarre behaviors can be understood as "attempts on their part to defend against such psychological 'death'" (p. 682).

Cohen, Paul, and Volkmar (1987) stated that autistic children do not experience normal transitions from calm through active to aroused states. They may appear too calm, showing no needs, or may be inconsolable or miserable, no matter what is done for them. They may have a tendency not to feel pain when injured, or act as though in pain for no reason.

Schopler, Reichler, DeVellis, & Daly (1980) stated that bizarre use of body movement and persistence of stereotypes are considered major features of autism according to Creak (1961), Rutter (1978), and others. Autistic children have peculiarities in relating to nonhuman objects (Schopler et al., 1980). This has special significance for educational assessments and individualized planning because of the child's peculiar relationship to toys and materials.

Kanner (1943) identified resistance to change as a primary feature of autism. Rutter (1978) maintained it as a primary feature in light of subsequent research. However, it was only considered a subsidiary characteristic by Ritvo and Freeman (1978).

Autistic children often avoid eye contact during personal interactions or may visually avoid toys and educational materials (Schopler et al., 1980). In those children who do make eye contact,

it may be inappropriate. It will be too fixed at some times and averted at other times (Wing & Attwood, 1987).

Autistic children also may avoid auditory stimuli or they may overreact to certain noises or sounds. This inconsistent response has implications for learning speech or alternative communication skills (Schopler et al., 1980). Many autistic children are preoccupied with "tactual exploration, mouthing, licking, smelling, and rubbing of objects" (Schopler et al., 1980, p. 95).

An intensive aversive response is frequently observed in autistic children and is included in the Creak (1964) criteria. "They may show intense fear of some harmless things, such as of a particular color, or entering buses or bathtubs, or even of specific people. The fears may later turn into a special fascination, or vice versa" (Wing & Attwood, 1987, p. 7).

Paul (1987) stated that deviant language has been recognized as a hallmark of autistic syndromes since autism was first described. Autistic children employ aberrant verbal and nonverbal patterns and forms of communication. Both the range and forms of early communicative functions are deviant. However, there is a basic intention to communicate in the autistic population, according to Paul (1987).

Hyperactivity is frequently present in preschool autistic children and it persists to some extent during the early grades (Paul,

1987). Autistic children are distractible and restless. Some of them may be truly hyperactive, but that is not common (Wing & Attwood, 1987).

Cognitive skills are sometimes uneven in autistic children. They may have unusual peak skills, such as abilities in music or with numbers. Intellectual discrepancies are sometimes present (Schopler et al., 1980).

Instruments

The Uzgiris and Hunt Scales of Infant Psychological Development

The instruments chosen for this study can all be used successfully with autistic and trainable children. The Uzgiris and Hunt Scales of Infant Psychological Development are "Piagetian-based infant scales . . . appropriate for use with handicapped populations," according to Dunst (1980, p. 5). They can be administered in a flexible manner which "permits the child to play with the test materials in any way he or she desires" (p. 15). They can be "administered in a playful manner and not be viewed as demand situations. The more easygoing the assessment is, the more likely optimal performance will be obtained" (p. 15). Autistic children often do not respond as one would hope to demand situations. The flexibility of administration and easygoing manner help make results obtainable. The Uzgiris and Hunt scales consist of eight subscales. Each subscale has a number of separate ordinal steps. The steps

delineate a stage in the development of the ability measured by the subscale. The subscales are

1. object permanence
2. use of objects as means
3. learning and foresight
4. development of schemata
5. development of an understanding of causality
6. conception of objects in space
7. vocal imitation
8. gestural imitation

The Uzgiris and Hunt Scales attempt to "measure underlying intellectual processes that are associated with natural stages of development" (Sattler, 1982, p. 255).

Uzgiris and Hunt (1975) have presumed that competence and intelligence are based on a "hierarchical organization of a number of abilities and motive systems with several relatively independent branches" (p. 15). They also presumed this hierarchical organization of motives and abilities is made up of coordinations and differentiations among the sensorimotor organizations present at birth. These progress toward the symbolic representations and regulations which comprise competence. Uzgiris and Hunt felt "intelligence undergoes an epigenetic development analogous to embryonic development of organ structures" (p. 15). They adopted the

working assumption that the course of development within each branch would follow a consistent order.

Although the Uzgiris and Hunt scales were developed for assessing infants, they are also used with "older retarded and handicapped children who are at risk for manifesting delays and/or deviations in their sensorimotor development" (Dunst, 1980, p. 1). The seven branches of the scales parallel Piaget's domains of sensorimotor development (1936, 1937, 1945). Sensorimotor intelligence is a practical adaptive intelligence. The ordinal construction and hierarchical sequence of each of the individual scales are such that higher levels of achievement are intrinsically derived from those at preceding levels and encompass them (Dunst, 1980).

With the Uzgiris and Hunt (1975) scales "it is possible to discern a child's major strengths and weaknesses by constructing a profile of sensorimotor abilities" (p. 1). To establish the developmental status of a child, one notes the highest item passed on each of the sensorimotor scales administered. An estimated developmental age (EDA) and stage placement is obtained for each branch. Strengths and weaknesses are determined by "graphically depicted a child's variability in performance across the seven branches of development" (p. 3). This ordinal scale yields only a ceiling because of its hierarchical construction.

Ordinal scales can be administered without the standard test procedures and standardized materials of other kinds of tests. The

goal is to obtain optimal performance in each domain. Varied materials and eliciting situations to determine the true performance of the child can be used. Spontaneously emitted behaviors can also be used.

Concurrent validity of the Uzgiris-Hunt EDA placements was investigated by Dunst using the Griffiths (1954) Mental Development Scale. The performance scores on the two scales correlated significantly within and across scales. "In terms of concurrent validity, these results reveal that the EDA's are good indicators of a child's actual quantitative developmental performance" (Dunst, 1980, p. 98). The procedure for determining the quantitative level of developmental performance is considered valid. "Even with chronological age (CA) partialled out, the correlation between mental age (MA) and EMA remained high [$r\ (34)=0.83$, $p < 0.01$, two-tailed test]" (p. 98).

Dunst's investigation yielded results consistent with previous studies by Wachs (1970) and Wachs and DeRemur (1978) who reported "significant relationships between sensorimotor abilities as measured by the Uzgiris and Hunt scales and psychometric test performance" (Dunst, 1980, p. 100). Dunst concluded that the methods used with the Uzgiris-Hunt "for quantifying both sensorimotor performance levels and the extent to which there are discrepancies in development are valid procedures" (p. 101).

Wachs (1975) conducted a study of infants between 12 and 24 months of age to investigate the relationship between the Uzgiris and Hunt scales and the Stanford-Binet Intelligence Scale. The subscale, Object Permanence, was significantly related to later Binet performance at all ages tested. There was also a consistently significant pattern of relationship across all five age levels tested on the Object Permanence subscale.

Kahn (1976) found the Uzgiris and Hunt scales to be both reliable and ordinal. In later research (1983), he demonstrated that a relationship exists between certain Uzgiris and Hunt scales and communication and adaptive behavior scales in the severely and profoundly retarded.

Cowan (1978) stated that evidence suggests the Uzgiris and Hunt Scales correlate significantly with the Bayley Mental Scale. Black male infants were assessed at 17, 18, and 22 months of age by King and Seegmiller (1973). The tests were statistically significant but low to moderate.

The Childhood Autism Rating Scale (CARS)

The Childhood Autism Rating Scale (CARS) represents the "varied diagnostic criteria and . . . broadened, data-based definition of the autism syndrome" (Schopler et al., 1986, pp. 9-10). It is based on over a decade of use with more than 1,500 autistic children, is applicable to all ages, and is objective and quantifiable. CARS

ratings can be made during diverse conditions despite level of behavioral control of the youngster. The CARS can be used by a "variety of well-informed individuals who are not necessarily diagnosticians" (p. 23).

To complete the CARS, the child's behavior is observed directly and rated on a 7-point scale. Separate ratings are summed to provide a total score. For this total score there are cut-offs for classifications of nonautistic, mildly to moderately autistic, and severely autistic. The manual provides clear descriptions of sample behaviors at 4 points on each of the separate subscales. "This makes it possible to use this scale without extensive training" (Short & Marcus, 1986, p. 164).

The behavioral characteristics measured by the Childhood Autism Rating Scale (CARS) were drawn from varied diagnostic criteria and definitions of the autism syndrome (Schopler et al., 1986). Fifteen different items are considered in identifying whether a child is not exhibiting the autistic syndrome, is exhibiting it in a mild to moderate fashion, or is exhibiting autistic characteristics in a moderate to severe fashion.

The first item is a "rating of how the child behaves in a variety of situations involving interaction with other people" (Schopler et al., 1986, p. 27). Both structured and unstructured situations in which the child has a chance to interact with others are considered.

How the child reacts to varying intensity of persistence on the part of the other person is also rated. Especially to be noted is how persistent or forceful an adult must be to secure the child's attention. Reaction to physical contact; physical signs of affection; and to praise, criticism, or punishment is also considered. Also considered are the degree to which the child clings to parents or others; whether or not the child initiates interactions; and whether the child is responsive, aloof, shy, and aware of strangers.

The second item rated on the CARS is imitation of verbal and nonverbal acts. The most important instruction for this item is that the behavior to be imitated must be clearly within the child's abilities. Imitation ranges from repeating simple sounds to imitating movements of the whole body or imitating behaviors with objects (cutting with scissors or copying shapes with a pencil). The rater must be sure the child understands that he or she is supposed to imitate. One should try to determine whether the child is unwilling to imitate, unable to understand that the person wants imitation, or is unable to physically or otherwise perform the imitation. It is also recommended that a wide variety of situations should be observed and notice should be taken on whether the imitation occurs immediately or after a delay (Schopler et al., 1986).

The child's emotional response is the third item rated on the CARS. It involves rating how the child reacts to both pleasant and

unpleasant situations and determining whether or not the child's feelings or emotions are appropriate. The type of response and the intensity of response are both looked at. The child is evaluated on how one responds to affection or praise, a tickle, a favorite item, or a pleasant game. The child is rated on responses to unpleasant stimuli such as punishment or difficult work demands. "Inappropriate type of response may include such things as laughing when spanked or shifting mood unpredictably, without apparent reason" (Schopler et al., 1986, p. 31). Inappropriate degree of response includes such things as showing a lack of emotion "in situations where normal children of the same age would show some form of emotion" (p. 31). It also includes tantrums, or becoming highly agitated or excited in response to some minor occurrence.

Body use, including coordination and appropriateness of movements is the fourth area on the CARS. The deviations included are such things as posturing, tapping, spinning, rocking, self-directed aggression, and toe-walking. The frequency and intensity of the bizarre body use is evaluated. Persistence of the behaviors is considered.

Object use is the fifth item rated. It considers the child's interaction with toys and other objects, especially in unstructured activities with many objects available. The level of interest displayed is noted. Particular attention is paid to use of toys with

dangling or spinning parts. Excessive preoccupation with such items is considered. Overly repetitious use of certain toys is noted. Excessive interest in objects normally of no interest to a child is also considered. Further, the child is shown a more appropriate way to use certain items and then observed to see if the behavior changes or persists with the usual manner continuing.

The sixth item on the CARS has to do with the child's reaction to changing from one activity to another. The child's reaction to adult attempts to change a pattern or routine is considered. "Does the child establish elaborate rituals around specific activities such as eating or going to bed?" (Schopler et al., 1986, p. 37). Arranging items a certain way or using only certain items are also considered.

Visual response, the seventh item on the CARS, is a rating of unusual visual attention patterns when the child is required to look at certain objects or materials. Does the child use eyes normally? Does the child look a person in the eye or avoid eye contact when engaged in social interaction? How often must a child be prompted to attend visually? Does the child have to have physical guidance to attend visually? Does the child gaze at his or her wiggling fingers or become absorbed in watching movements or reflections?

Listening response is a rating involving reactions to human voices and other kinds of sound. The child's interest in various sounds is also noted. Preferences for or fears of certain everyday

sounds are noted. Inappropriate reactions to the loudness of sounds is considered. Behaving as though uncomfortable when normal sounds occur is noted. It is important to consider the sound and not the sight of the object producing the sound.

Taste, smell, and touch response is the ninth CARS item. This is a rating of the "near" senses and whether or not the child makes appropriate use of these sense modalities. Does the child show either excessive avoidance of or interest in certain foods, odors, tastes, or textures? Does the child become preoccupied with feeling certain surfaces? Are ordinary objects smelled by the child? Does the child attempt to eat inedible items? Does the child react in an unusual manner to pain?

Fear or nervousness is the tenth CARS item. It is a rating of unusual or unexplainable fears and includes rating the absence of fear in situations where a normal child would be fearful. The frequency, severity, and duration of the child's reaction is considered. Are the fears reasonable or understandable? Unusual nervousness is also considered. Does the child have an intense startle response to normal sound or movement?

Verbal communication is the eleventh area considered. It is a rating of all facets of the use of speech and language. The presence or absence of speech is considered as well as the peculiarity, bizarreness, or inappropriateness of utterances if speech is present.

When speech is present; vocabulary, sentence structure, tonal quality, volume or loudness, rhythm, and content of meaning are all taken into consideration. Three particular peculiarities to note are echolalia, pronoun reversal, and the use of jargon.

Activity level is also considered as an important area. Overactivity as well as lethargy are part of this area. How much does the child move about in restricted and/or unrestricted situations? How does the child move about in a free play area or react when required to sit still? If the child is excessively active, can he or she be calmed down easily with encouragement or reminder? The influence medications might have on movement are also taken into consideration when making this rating.

Level and consistency of intellectual functioning is considered also on the CARS. This is concerned with the general level of intellectual functioning and the consistency or evenness of functioning across skills. The intention of this scale is to identify the extremely unusual or "peak skills" characteristic of some autistic children. Does the child display unusual skill in one or two areas that are different from general level of intellectual functioning? Does the child have special talents such as with numbers, rote memory, or music? Does the child take things very literally past an age that would be appropriate?

The final area on the CARS is general impressions. It is intended to be an overall subjective impression of the degree to which

the child appears to be autistic as defined by the previous 14 items. The rating should be done without averaging the other ratings. The rater should take into consideration all available information from all sources. The child's case history, opinions of the parents, and past records should all be considered when deciding if one believes the child exhibits no autism, mild autism, moderate autism, or severe autism.

The 15 items from the Childhood Autism Rating Scale (CARS) described above are evaluated in relation to the child's chronological age. How much does the child differ from a normal child of the same age? The more abnormal the behavior would be, the higher the score that would be assigned (Schopler et al., 1986).

Rationale for use of the CARS is based on Kanner's (1943) definition, the nine points of the British Working Party (Creak, 1964), Rutter's (1978) criteria, the definition of the National Society for Autistic Children (NSAC, 1978), and that in the American Psychiatric Association's DSM III (1980). Because of inclusion of characteristics from varying definitions, researchers are able to test whether a specific criterion is an essential feature, as determined by the CARS, or "whether it is a nonessential characteristic found in some autistic children but not in others" (Schopler et al., 1980, p. 92).

In the development of the CARS, 534 children were assessed over a 10 year span. Approximately 75% were boys. For both sexes the age

distribution was consistent. In the group, 55% were less than 6 years old and 11% were 10 years old or older. The model socioeconomic status (SES) of the children's families was IV—the second lowest of five SES categories yielded by Hollingshead-Redlich (1958) two-factor (occupation and education) index. In the sample, 71% were white and 29% were black. Intellectual deficits were present with 70% having IQs below 70 and 11% with IQs above 85, as measured by standardized tests (Schopler et al., 1980).

Assessment of internal consistency on the CARS was carried out by computing a reliability coefficient alpha (Nunnally, 1967). The alpha obtained was .94. This indicates a high degree of internal consistency among the items on the scale. It indicates that "taken as a whole, the CARS measures some unitary, central characteristic rather than numerous unrelated facets of behavior" (Schopler et al., 1980, p. 96). Reliability was also assessed by correlating the ratings of two independent, trained raters. Based on 280 cases, average interrater reliability was .71. Both of the above indicate that the CARS is a highly reliable instrument (Schopler et al., 1986).

To assess test-retest reliability, total scores from two testings approximately one year apart were compared for 91 cases. The correlation was .88 ($p < .01$) and the means (31.5 compared to 31.9) were not significantly different. A review of these findings indicates the CARS is stable over time. Also, the data were analyzed

to assess agreement of diagnostic categorizations. Agreement occurred 82% of the time. Coefficient Kappa, correcting for chance, was .64. Kappa of .60 or higher is acceptable. Test-retest reliability was good (Schopler et al., 1986).

To determine validity of the instrument, total scores were compared to clinical ratings obtained at the same sessions. The correlation was .84, $p < .001$. This indicates that the CARS' scores have a lot in common with the perceptions of the clinicians. Total scores were also correlated with independent clinical assessments made by a child psychologist and a child psychiatrist. Correlations were .80, $p < .001$. This offers "additional support for the validity of the CARS. In summary, the CARS yields results consistent with the judgments of clinical experts" (Schopler et al., 1980, p. 97).

According to Parks (1983), strengths of the CARS are "an empirically derived scoring criteria . . ., the provision of detailed anchor points for the subscales . . ., and good interrater reliability using a large number of cases" (p. 265). A weakness was the lack of extensive data on validity.

Olley and Marcus (1984) stated that one of the purposes of assessment of autistic children is to answer the question, "does this child have the characteristics associated with autism?" (p. 73). They added that the Childhood Autism Rating Scale is "a reliable observational scale" (p. 75).

Psychoeducational Profile (PEP): Imitation Scales

The Psychoeducational Profile (PEP), by Schopler and Reichler (1979), was designed primarily for planning individualized curricula for autistic children. Administration is very flexible and language is minimized. The PEP grew out of the Child Research Project, Department of Psychiatry, University of North Carolina at Chapel Hill. It has been used in the statewide program, Project TEACCH, for autistic children for a number of years. Olley and Marcus (1984) stated that it includes some important emphases that can provide useful information about autism. According to Short and Marcus (1986), many of the materials used in the PEP "have intrinsic appeal for many autistic children" (p. 168). The imitation Scale is one of the developmental function areas of the PEP. Gerken (1983) suggested that the PEP is a comprehensive inventory of idiosyncratic learning patterns in children who functionally are at a preschool level but who are chronologically 1 to 12 years of age. The age equivalents obtained on the PEP can be compared to mental ages on other tests. The PEP and the CARS can be used together in the formulation of a diagnosis, according to Short and Marcus (1986).

Normative data were collected on the PEP using 276 normal children between the ages of 1 and 7 years residing in North Carolina. This was done so that individual test items could be arranged developmentally within the function areas and so that meaningful

comparisons could be made between different functions. The normal comparison sample was not meant to be used as a standardization study.

The authors of the PEP (Schopler & Reichler, 1979) stated that it is not used to construct a precise, standardized score that allows one child to be compared to another on an invariant scale and that each administration is individualized to the child. They have not provided reliability data.

No formal validity studies have been undertaken, but they feel validity can be demonstrated. Regarding content validity, test items were chosen from a wide range of developmental skills, usually mastered by normal children and during revisions (over a 10 year period of use), items have been empirically tested. Those that were not clinically meaningful were eliminated. A small research project involving 69 retarded children has tentatively found that the retarded children's profiles were similar to the normal sample so that a child with a mental age of 3 scored approximately the same as a normal 3 year old. The retarded children also showed equivalent retarded development across functions. On the other hand, psychotic children had wide variations in developmental functions across the different areas.

The items on the Imitation Scales of the PEP which were used in this study were as follows (Schopler & Reichler, 1979):

Imitation

Motor

Manipulates a kaleidoscope

Taps the call bell twice

Rolls clay into an elongated strand

Manipulates cat puppet

Imitates gross motor movements

Vocal

Imitates animal sounds: puppets

Repeats two and three digits

Repeats four and five digits

Imitates sounds

Imitates words

The authors of the PEP emphasized the importance of the relationship between imitation and language. "A child must be able to imitate in order to learn words. . . . In addition to speech, imitation plays an invaluable role in socialization" (Schopler & Reichler, 1979, p. 9).

Test of Language Development-Primary (TOLD-P): Sentence Imitation Scale

The Test of Language Development-Primary (Newcomer & Hammill, 1982) was designed to assess comprehension and expression of spoken language. It has a total of seven subtests. In this research, only the Sentence Imitation Scale, one of the subtests, was used. It is untimed. The TOLD-P has been found to be effective in discriminating between language-impaired and non-impaired children.

Norms for TOLD-P are based on 1,836 children who spoke "typical English." They were drawn from all geographic areas of the United States and represented a variety of ethnic, linguistic, and social class backgrounds. The authors of the TOLD-P list as one of its four principal uses "to serve as a measurement device in research studies involving language behavior" (Newcomer & Hammill, 1982, p. 1).

The TOLD-P has a linguistic model as a theoretical base. The linguistic component of the subtest used in this research is syntax, or the correct sequencing of words and inflections to form sentences. The Sentence Imitation subtest involves speaking, or expressive language, and emphasizes word ordering. It measures aspects of ability to produce correct English sentences. It is based on the assumption that it is easier to imitate grammatical forms that are part of a child's linguistic repertoire than to repeat those that are unfamiliar. The child is required to imitate sentences presented by the examiner. Verbatim imitation is necessary for a sentence to be scored as correct. The shortest sentence in the TOLD-P contains five words.

Reliability of the TOLD-P has been examined in terms of internal consistency, stability, and standard error of measurement. The authors of the test reported that the Sentence Imitation and two other subtests "have adequate internal consistency at all of the age levels studied" (Newcomer & Hammill, 1982, p. 34). They found the

coefficients associated with those subtests to equal or exceed .80. Other studies found the same, and a study, conducted in Canada, found a coefficient alpha of .95 for the Sentence Imitation subtest. A study with children diagnosed as having disorders in oral communication had internal consistency correlations for subtests ranging from .80 to .89. This suggests that all of the subtests of the TOLD-P can be administered reliably to children who are linguistically handicapped.

Stability was tested using the test-retest method. The Sentence Imitation subtest Pearson product-moment coefficient of .98 was statistically significant beyond the .01 level of confidence. Allen (1985), however, warned that there were only 21 children involved in the study of test-retest reliability. The standard error of measurement for the Sentence Imitation subtest ranges from 0.7 to 2.1 looking at raw scores and standard scores at each age level (4 through 8).

Validity was reviewed in terms of content validity, criterion-related validity, and construct validity. A group of 100 language professionals were asked to examine content validity. The authors claimed that the ratings by the professionals "can be interpreted as additional support for the content validity of the test" (Newcomer & Hammill, 1982, p. 39).

In criterion-related validity, there is not yet proof of predictive validity, but concurrent validity was explored. Two

criterion tests were used with the Sentence Imitation subtest. They were the Northwestern Syntax Screening Test-Expressive (NSST) and the Detroit Test of Learning Aptitude Related Syllables (DTLA). Pearson product-moment correlation coefficients, with a correction formula taking reliability into account, were .77 between Sentence Imitation from TOLD-P and the NSST-Expressive and .84 between Sentence Imitation and the DTLA-Related Syllables.

Construct validity was studied at length. Areas examined were age relatedness, intercorrelation between subtests, relationship with tests of intelligence, relationship to academic performance, differentiation between groups of children known to be normal and abnormal in spoken language, and "loading" on factors consistent with the underlying theoretical model.

On the Sentence Imitation subtests, children did progressively better as they grew older and principal subtests were highly interrelated. The Sentence Imitation subtest correlated .71 with the Slosson Intelligence Test for Children and Adults. Studies with the Wechsler Intelligence Scale for Children-Revised and with tests of reading, writing, readiness, and achievement all were highly significant and supported construct validity. Group differentiation was found with the Sentence Imitation subtest in studies using eight different diagnostic groups (Newcomer & Hammill, 1982).

Allen (1985) warned that, on the Sentence Imitation Test, a number of the items are in question form. She felt a child might

answer the question rather than imitate it. She also warned that it is unclear if all the subtests are appropriate for users of nonstandard English.

CHAPTER III
METHODOLOGY

Overview

The purpose of this study was to investigate whether scores of students placed in programs for autistic (profoundly handicapped) students, with intellectual ability in the trainable mentally handicapped range, would differ from scores of students placed in the trainable mentally handicapped program on scales measuring object permanence, vocal and gestural imitation, and on a scale used to rate the behavioral characteristics for identification of the autism syndrome. Another purpose was to investigate whether there would be differences within the groups on the abilities to imitate vocally and gesturally.

Subjects

For the purposes of this study, autistic students consisted of those who were in programs for autistic (profoundly handicapped) in the State of Florida based on state criteria for placement in such a program. All Florida counties must abide by state regulations when placing students in any of the exceptional education programs. Specific common criteria have been established to define each group.

As of February, 1987, 449 children in Florida public schools were classified as autistic (P. Hollis, personal communication, September 3, 1987) and 215 of the 449 attended school in 3 of the 67 counties. Forty-one counties had no autistic students in exceptional student education programs. The 23 remaining counties each had fewer than 27 autistic students. Among those counties, the four with greatest enrollments had 25-27 autistic students in programs. Three of those four counties (Broward, Duval, and Palm Beach) were chosen for the study. Broward County had 26 autistic students, Duval had 27, and Palm Beach had 25. Of the 78 autistic children in the three counties, 36 were between the ages of 5 and 11, 32 were between 12 and 18+ years, and 10 were between 0 and 4 years old.

The psychological services records of all autistic children between the ages of 5 and 12 years of age in each county were reviewed by the researcher. Any child with a reported measured IQ between 3 to 5 standard deviations below the mean who had no sensory impairment was accepted for the study. A total of 13 children were found within this range. Tests which had been used to determine the intellectual level were the following:

1. Stanford-Binet Intelligence Scale, Form L-M (6 students)
2. Leiter International Performance Scale (3 students)
3. Cattell Test of Infant Intelligence (3 students)
4. Wechsler Intelligence Scale for Children-Revised (1 student)

In addition to these 13 students, 8 other students were included who fell in the same range of mental retardation according to developmental tests, adaptive functioning, and statements by diagnosticians. Altogether 21 autistic students between the ages of 5 and 12 with intellectual ability reportedly in the same range as children in trainable programs were found in the three counties.

For the purposes of the study, trainable mentally handicapped students were those who had been placed in programs for trainable mentally handicapped (TMH). Of the 5,644 trainable mentally handicapped students in the State of Florida in February, 1987, 470 were in Broward County, 395 were in Duval County, and 221 were in Palm Beach County (L. Beard, personal communication, April 15, 1988).

Lists of trainable mentally handicapped students were obtained from the three county administrators. For each autistic child in the study, all trainable children of the same gender whose age at the time of testing would be within + or - 6 months of the autistic child were listed. In some cases, this was only one child. In that case, that child would be matched with the autistic student. In cases where there was more than one trainable child of the correct age and gender for an autistic child, a name was randomly chosen and that trainable mentally retarded child was matched with the autistic child.

Procedure

Permission to conduct the study was obtained from the research committees in each county. Permission to work in the schools involved

was obtained from the principals of the individual schools. All seven principals wrote letters expressing their approval of the study. The appropriate letter from the principal, a cover letter from the researcher, and a letter requesting informed consent were sent to the parents of the 21 autistic students. Nineteen parents returned the consents by mail. Two parents returned the consent after follow-up notes were sent from their child's school. Twenty autistic students were tested. One autistic student, for whom consent had been obtained, moved out-of-state before being tested.

Cover letters and the informed consent form also were mailed to the parents of all the trainable matches. Nine parents returned signed consent forms by mail. Follow-up procedures included second letters to some parents, a note of reminder to some parents from the child's school, and personal contact by the researcher in two cases.

One autistic girl was dropped form the study because there was no girl within 6 months of her age in the TMH program in her county to serve as her match. One autistic boy was dropped in another county because no informed consent could be obtained from the parents of any of the trainable boys of the appropriate age. In the third county, an autistic girl could only be matched with a trainable boy, and an autistic boy could only be matched with a trainable girl of the appropriate ages. These autistic children were retained in the study because the two cases balanced each other and the number of autistic

boys and girls in the county still was equal to the number of trainable boys and girls.

Variables

One group of variables in this study included three of the sensorimotor domains which are part of the stage ordered postulated sequences of behavior posited by Piaget (1936). The domains chosen were object permanence, vocal imitation, and gestural imitation.

The second group of variables studied was made up of behavioral characteristics. Included were the 15 items frequently used to identify autistic children (Schopler et al., 1986). These variables were relating to people; imitation; emotional response; body use; object use; adaptation to change; visual response; listening response; taste, smell, and touch response and use; fear or nervousness; verbal communication; nonverbal communication; activity level; level and consistency of intellectual functioning; and general impressions.

Instruments

Once subjects had been chosen and permission obtained from their parents, the children were administered the Uzgiris and Hunt Scales of Infant Psychological Development. The methods of administration, recording, and scoring developed by Dunst (1980) were followed and his Summary Record Form was used. The Uzgiris and Hunt Scales are Piagetian based scales that measure underlying intellectual processes. Object permanence and gestural and vocal imitation were the domains included in the study.

The Imitation scales from the Psychoeducational Profile (PEP) developed by Schopler and Reichler were also used with each child. For those students who successfully imitated words on the previous two tests, the Sentence Imitation scale of the Test of Language Development-Primary (TOLD-P) was also used. In it the child was asked to repeat sentences.

The Childhood Autism Rating Scale (CARS) was completed by each child's teacher. The CARS was used to assess the behavioral characteristics usually associated with autism.

Qualifications of Test Administrators

The Uzgiris and Hunt Scales were administered in all three counties by the researcher, a certified school psychologist. The portions that were used of the PEP and the TOLD-P were also administered by the researcher. At the time of the study, she was employed as a school psychologist in Broward County, Florida.

To improve skills in administration of this test, the researcher studied films published by the University of Illinois Press on administration of the Uzgiris and Hunt Scales. She had used the Childhood Autism Rating Scale (CARS), the Psychoeducational Profile (PEP), and the Test of Language Development-Primary (TOLD-P) in her work as the school psychologist in an exceptional student center.

The teachers who completed the Childhood Autism Rating Scale (CARS) were all employed by the school boards of their various

counties. They were all trained by the researcher in the use of the CARS. Some teachers had previous experience using the CARS and were familiar with it.

Analysis

The data were analyzed in two parts. First, the estimated developmental ages (EDA) on the Object Permanence, Vocal Imitation, and Gestural Imitation scales of the Uzgiris and Hunt Scales and the scores on the CARS and the PEP were compared for the autistic and trainable groups using dependent sample *t* tests and the Wilcoxon Matched-Pairs Signed-Ranks Test. The same would have been done for the TOLD-P, but there were too many scores of zero for it to be analyzed statistically.

In the second part of the analysis, the Vocal Imitation EDAs of the autistic group were compared to the Gestural Imitation EDAs of the group (Uzgiris and Hunt Scales) using dependent sample *t* tests and the Wilcoxon Matched-Pairs Signed-Ranks Tests (subjects serving as their own controls). The same was done for the trainable group's Vocal and Gestural EDAs on the Uzgiris and Hunt. The parametric analysis was carried out using an SAS computer package. The nonparametric statistical analysis was done by hand.

CHAPTER IV
ANALYSIS OF RESULTS

The purpose of this study was to investigate whether students placed in programs for the autistic (profoundly handicapped) in the State of Florida, with intellectual ability in the trainable mentally handicapped range, would score differently from students placed in the trainable mentally handicapped program on scales measuring object permanence, vocal and gestural imitation, and the behavioral characteristics usually associated with autistic children. Another element of the study was to determine if there were any significant differences within either group (autistic or trainable) between vocal or gestural imitation abilities. All autistic children in the three counties who met the criteria and for whom consent and a match could be obtained were included. The trainable students were a stratified random sample chosen to match the autistic students on the basis of county, age (within 6 months), gender, and general intellectual level (between three and five standard deviations below the mean).

Data were collected on 36 students in three Florida counties. The Uzgiris and Hunt Scales of Infant Psychological Development (Visual Pursuit and the Permanence of Objects, Vocal Imitation, and

Gestural Imitation scales), the Psychoeducational Profile (PEP) (Imitation scale), the Test of Language Development-Primary (TOLD-P) (Sentence Imitation scale), and the Childhood Autism Rating Scale (CARS) were utilized.

An illustration of the characteristics of the subjects in the study can be found in Table 1. The autistic students ranged in age from 5 years 1 month to 12 years 11 months. The trainable students ranged from 5 years 7 months to 13 years 3 months. There were 10 males and 8 females in each group. Broward County had 5 males and 0 females per group, Duval County had 4 males and 4 females per group, and Palm Beach County had 1 male and 4 females per group.

These data were gathered between July 1, 1987, and January 26, 1988. All direct testing was conducted by the examiner. A rating scale was completed by each child's teacher.

In this study, two groups with a decided number of contrasts were being compared. The contrasts were first tested using dependent sample t statistics. Each hypothesis was evaluated at alpha equal .05 level of significance.

Significance tests using a t statistic involve the assumption that populations are approximately normally distributed and variances are homogeneous, however, the t statistic is "robust with respect to violation of both assumptions provided the number of observations in the samples is equal" (Kirk, 1982, p. 100).

Table 1

Characteristics of Subjects

Characteristic	Group	
	Autistic	Trainable
Mean age at testing	115 months	117 months
Number of white students	14	11
Number of black students	01	07
Number of Hispanic students	03	00
Number of males	10	10
Number in Broward County (male 5, female 0)	05	05
Number in Duval County (male 4, female 4)	08	08
Number in Palm Beach County (male 1, female 4)	05	05

Because there were significant differences in standard deviations between the two groups for each instrument, nonparametric procedures were also utilized on the data to see if they would corroborate the findings of the *t* tests. The use of nonparametric statistics was supported for several reasons. Siegel and Castellan (1988) stated

that "if the sample size is very small, there may be no alternative to using a nonparametric statistical test unless the nature of the population distribution is known exactly" (p. 35). The possible ordinal quality of the data also supported the use of nonparametric statistics. According to Siegel (1956), with ordinal scaling, hypotheses should be tested by using nonparametric statistical tests, and the median is the most appropriate statistic for describing the central tendency of scores in an ordinal scale.

The Wilcoxon Matched-Pairs Signed-Ranks tests was the nonparametric procedure used to compare the groups on each instrument. It was also the procedure used to compare each group's Uzgiris and Hunt Vocal Imitation scores with its Uzgiris and Hunt Gestural Imitation scores. For the within groups analysis, each subject was used as his or her own control. The Wilcoxon employs both the magnitude and the direction of the differences (Marascuilo & McSweeney, 1977). Zero difference scores were dropped from the total number. Tied differences were handled using the midrank procedure. The assumption that the two populations in the study are symmetrically distributed may have been violated. If so, the null hypotheses could be erroneously accepted or rejected because of differences in shape rather than differences in means and medians.

Choice of analysis was difficult because of the small number of pairs. Since the data may have violated one assumption for the

dependent sample t test or another assumption for the Wilcoxon, both procedures were used. The fact that significant differences were found for the same contrasts using both parametric and nonparametric analyses lends added credence to the findings.

Contained in Table 2 are the scores earned by the autistic students and in Table 3 the scores earned by the trainable students. An initial is used for each county (B = Broward, D = Duval, P = Palm Beach). Age was rounded to the next highest month (at 15 or 15+ days). EDA is the abbreviation for "estimated developmental age" on the Uzgiris and Hunt Scales. The score for the PEP and the TOLD-P were total number imitated correctly. Other abbreviations not previously used are VPPO = Visual Pursuit and the Permanence of Objects (or Object Permanence), VI = Vocal Imitation, and GI = Gestural Imitation. Table 4 contains the dependent sample t test analysis between groups, Table 5 contains the Wilcoxon Matched-Pairs Signed-Ranks Analysis between groups, and Table 6 contains the significance levels for both analyses for each of the first six hypotheses.

Research Hypothesis 1

The first hypothesis was that there are no differences in performance between autistic children and trainable mentally handicapped children on the Visual Pursuit and the Permanence of Objects scale of the Uzgiris and Hunt Scales of Infant Psychological Development.

Table 2

Performance of Autistic Subjects

County	Gender	Age	CARS	U-H VPPO EDA	U-H VI EDA	U-H GI EDA	PEP	TOLD-P
P	F	5-1	45	23	01	12	00	00
D	M	5-2	35.5	23	23	23	04	00
D	M	6-10	39	08	01	08	02	00
B	M	7-4	35	23	23	23	09	02
P	F	7-5	31	13	12	23	03	00
P	F	8-3	27.5	23	17	23	04	00
D	M	9-2	45.5	15	06	07	02	00
B	M	9-6	48.5	18	23	23	05	02
D	F	10-1	25	18	23	23	05	01
D	F	10-2	52	05	01	02	00	00
D	F	10-6	35.5	22	23	23	08	04
B	M	10-8	48.5	08	04	12	00	00
D	F	11-0	37	08	03	09	00	00
B	M	11-4	47.5	<1	03	02	00	00
B	M	12-4	49	23	23	20	06	01
P	F	12-5	50	23	23	23	08	00
D	M	12-10	36	18	14	12	01	00
P	M	12-11	48.5	23	04	08	04	00

Table 3

Performance of Trainable Subjects

County	Gender	Age	CARS	U-H VPPO EDA	U-H VI EDA	U-H GI EDA	PEP	TOLD-P
P	F	5-7	24.5	13	14	09	05	00
D	M	5-7	48.5	13	18	19	02	00
D	M	7-0	35.5	08	23	20	05	00
B	M	7-0	23	23	23	23	08	00
P	M	7-3	18	18	23	23	07	00
P	F	8-8	41	23	17	23	04	00
D	M	8-10	26	23	23	23	07	00
D	F	9-9	22.5	23	23	23	10	10
B	M	9-10	21.5	22	23	23	06	00
D	F	10-6	35	22	23	23	06	00
D	F	10-8	32	22	23	23	07	00
B	M	10-10	29	14	20	11	03	00
D	F	11-1	22	22	17	23	08	00
B	M	11-8	27	23	12	23	06	00
B	M	12-6	16	23	23	23	09	01
P	F	12-6	39.5	23	23	23	06	00
D	M	12-9	37	22	14	23	06	00
P	F	13-3	19.5	13	23	23	08	02

Table 4

Dependent Sample t Test Analysis Between Groups

Group and Test	Mean for Groups	Standard Deviation for Groups	Standard Error of Mean Difference	Probability
Autistic - VPPO (U-H)	16.33	7.55		
Trainable - VPPO (U-H)	19.44	4.90	2.04	.15
Autistic - VI (U-H)	12.61	9.57		
Trainable - VI (U-H)	20.28	3.88	2.14	.002
Autistic - GI (U-H)	15.33	8.04		
Trainable - GI (U-H)	21.17	4.23	2.01	.01
Autistic - PEP	3.39	3.01		
Trainable - PEP	6.28	2.02	.71	.0008
Autistic - TOLD-P	*	*		
Trainable - TOLD-P	*	*	*	*
Autistic - CARS	40.89	8.38		
Trainable - CARS	28.75	9.02	3.09	.001

*Not analyzed because of excess number of zero scores.

Table 5

Wilcoxon Matched-Pairs Signed-Ranks Analysis

Test	Group		Probability
	Autistic Median	Trainable Median	
Object Permanence (U-H)	18.0	22.0	Not able to reject at .05
Vocal Imitation (U-H)	13.0	23.0	.01
Gestural Imitation (U-H)	16.0	23.0	.05
PEP Imitation	3.5	6.0	.01
TOLD-P	*	*	*
CARS	42.0	26.5	.01

*Not analyzed because of excess number of zero scores.

Table 6

Significance Levels for Each Hypothesis

Hypothesis	Dependent Sample t Test Probability	Wilcoxon Probability
1 Object Permanence Autistic/Trainable	.15	Not able to reject at .05
2 Vocal Imitation Autistic/Trainable	.002	.01
3 Gestural Imitation Autistic/Trainable	.01	.05
4 PEP Imitation Autistic/Trainable	.0008	.01
5 TOLD-P Sentence Imitation Autistic/Trainable	*	*
6 Childhood Autism Rating Scale Autistic/Trainable	.001	.01
7 Autistic Group Vocal/Gestural Imitation	.0172	.05
8 Trainable Group Vocal/Gestural Imitation	.4336	Not able to reject at .05

The results of dependent sample t tests and the Wilcoxon Matched-Pairs Signed-Ranks Test statistical analyses both revealed that the difference between the two groups failed to reach significance at the $p < .05$ level for the Visual Pursuit and the Permanence of Objects scale of the Uzgiris and Hunt Scales of Infant Psychological Development. Therefore, the null hypothesis was not rejected.

The autistic students had a median EDA of 18 months and a mean of 16.33 months. The trainable students had a median of 22 months and a mean of 19.44 months. Seven of the 18 autistic students had reached the highest stage and achieved the concept of object permanence. Seven of the trainable students had achieved the object permanence concept.

Research Hypothesis 2

The second hypothesis was that there are no differences in performance between autistic children and trainable mentally handicapped children on the Development of Vocal Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development. Use of the dependent sample t tests revealed significant differences ($p < .002$) and the use of the Wilcoxon revealed significant differences ($p < .01$) between the autistic children and the trainable children on the Development of Vocal Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development. Thus the null hypothesis was rejected.

The trainable students had significantly higher scores than the autistic students. The median EDA of the trainable group was 23 months and the mean was 20.28 months. The median EDA of the autistic group was 13 months. The autistic mean was 12.61 months. Eleven of the trainable students reached the highest level (imitates at least four novel words). Only seven of the autistic students reached the highest level.

Research Hypothesis 3

The third hypothesis was that there are no differences in performance between autistic children and trainable mentally handicapped children on the Development of Gestural Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development. The autistic group and the trainable group were differentiated using t tests ($p < .01$) and using the Wilcoxon analysis ($p < .05$) on the basis of scores on the Development of Gestural Imitation Scale of the Uzgiris and Hunt Scales of Infant Psychological Development. The null hypothesis, therefore, was rejected.

The trainable group scored significantly higher than the autistic group. The trainable EDA median was 23 months and the autistic EDA median was 16 months. The trainable EDA mean was 21.17 and the autistic mean was 15.33. Fourteen of the 18 trainable students had reached the highest level (imitates three invisible gestures without

object). Only 8 of the 18 autistic students had reached the highest level.

Research Hypothesis 4

The fourth hypothesis was that there are no differences in performance between autistic children and trainable mentally handicapped children on the Imitation scale of the Psychoeducational Profile (PEP). The autistic and trainable group scores were significantly different on the Imitation scale of the Psychoeducational Profile (PEP). Results using the dependent sample t tests were significant at $p < .0008$. Results using the Wilcoxon were significant at $p < .01$. Thus the null hypothesis was rejected.

The trainable students scored significantly higher than the autistic students on the Imitation scale of the Psychoeducational Profile (PEP). The median number of correct imitations for the trainable group was 6 and the median number for the autistic group was 3.5. The mean for trainable students was 6.28 and the mean for autistic students was 3.39. All of the trainable students imitated at least two items correctly and one trainable student had 10 correct imitations. Five of the autistic students failed to imitate any of the PEP items correctly.

Research Hypothesis 5

The fifth hypothesis was that there are no differences in performance between autistic children and trainable mentally

handicapped children on the Sentence Imitation scale of the Test of Language Development-Primary (TOLD-P). Only 5 of the 18 autistic students imitated even the first sentence on the TOLD-P (five words). Three autistic students could imitate more than the first sentence. Only 3 of the 18 trainable students imitated the first sentence on the TOLD-P (five words). Two trainable students could imitate more. Because of the large number of zero scores (28 of 36), these results were not analyzed statistically.

Research Hypothesis 6

The sixth hypothesis was that there are no differences in performance between autistic children and trainable mentally handicapped children on the Childhood Autism Rating Scale (CARS). The dependent sample t test indicated significant differences ($p < .001$) and the Wilcoxon analysis indicated significant differences ($p < .01$) between the autistic and trainable students on the Childhood Autism Rating Scale (CARS). The null hypothesis was rejected.

The autistic students were rated significantly higher than the trainable students on the characteristics associated with autism as measured by the CARS. The median score for the autistic group was 42 and for the trainable group was 26.5. The mean for the autistic group was 40.89 and the mean for the trainable group was 28.75.

Eleven autistic students were rated by the CARS as severely autistic and 11 of the trainable students were rated as non-autistic.

Five autistic students and four trainable students were rated as mildly-moderately autistic on the CARS. Two autistic students were rated as non-autistic and three trainable students were rated as severely autistic.

Research Hypothesis 7

The seventh hypothesis was that there are no differences in performance between the Development of Vocal Imitation scale and the Development of Gestural Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development for autistic children. The autistic children earned scores significantly different on the Development of Vocal Imitation and the Development of Gestural Imitation scales of the Uzgiris and Hunt Scales of Infant Psychological Development when analyzed using the dependent sample t test and the Matched-Pairs Signed-Ranks test (t test $p < .0172$, Wilcoxon $p < .05$). Hypothesis seven therefore was rejected.

The autistic students scored significantly higher on Gestural Imitation than on Vocal Imitation on the Uzgiris and Hunt Scales (median of 16 for gestural and median of 13 for vocal). The mean for Gestural Imitation was 15.33 and the mean for Vocal Imitation was 12.61.

Research Hypothesis 8

The eighth hypothesis was that there are no differences in performance between the Development of Vocal Imitation scale and the

Development of Gestural Imitation scale of the Uzgiris and Hunt Scales of Infant Psychological Development for trainable mentally handicapped children. A significant difference was not found between the trainable children's scores on the Development of Vocal Imitation scale and the Development of Gestural Imitation scale of the Uzgiris and Hunt using either the t statistic or the Wilcoxon Matched-Pairs Signed-Ranks Test. Consequently the null hypothesis was not rejected.

The trainable students scored very much alike on the Gestural Imitation scale and the Vocal Imitation scale of the Uzgiris and Hunt. Ten pairs scored the same, achieving the highest possible score. Therefore, the tests were based on differences in only eight pairs.

The median for each scale was 23, the highest possible score. The mean for Vocal Imitation was 20.28 and the mean for Gestural Imitation was 21.17. The fact that a significant difference was not found may not indicate that no difference existed. If the scales had included higher levels of imitation, the scores might have differed as they did in the autistic group.

CHAPTER V
DISCUSSION

This study was an investigation to determine whether students placed in programs for autistic (profoundly handicapped) with intellectual ability in the trainable mentally handicapped range, would score differently from students placed in trainable mentally handicapped programs on scales measuring object permanence, vocal and gestural imitation, and on scales used by educators to determine presence of the autism syndrome. The vocal and gestural imitation scores within each group (autistic and trainable) were also investigated. The autistic children were compared to children from their same counties. A trainable match was chosen for each autistic child. The match was the same gender (with two exceptions which balanced the total number) and the same age (within six months).

The Uzgiris and Hunt Scales of Infant Psychological Development (Visual Pursuit and the Permanence of Objects, Vocal Imitation, and Gestural Imitation scales), the Psychoeducational Profile (PEP) (Imitation scale), the Test of Language Development-Primary (TOLD-P) (Sentence Imitation Scale), and the Childhood Autism Rating Scale (CARS) were used. Eighteen autistic children and 18 trainable children in Broward, Duval, and Palm Beach Counties in Florida were studied.

Data were analyzed to determine if significant differences existed between the two groups on any of the instruments used. Parametric and nonparametric procedures were chosen. The dependent sample t test was the parametric analysis. The Wilcoxon Matched-Pairs Signed-Ranks test was the nonparametric analysis. Both procedures were used to analyze differences between the autistic and trainable groups. The Vocal and Gestural Imitation scale scores (Uzgiris and Hunt Scale) for each group (autistic and trainable) were also compared with both procedures to see if there were differences within either group on performance of the two kinds of imitation.

Results

For those children placed in programs for autistic (profoundly handicapped) and for those the same gender and age and in the same counties who were placed in programs for the trainable mentally handicapped, a significant difference was found between the autistic and trainable groups on vocal imitation as measured by the Uzgiris and Hunt Scales. The trainable students imitated vocally better than their autistic counterparts. Three of the autistic children did not vocalize at all. They only responded to a voice. Eight autistic children did not imitate familiar words. All 18 trainable children could imitate familiar words. Over half of the trainable students could imitate at least four novel words.

The trainable children were also significantly better able to imitate gesturally (according to the Uzgiris and Hunt Scale) than the

autistic children. Fourteen of the 18 trainable students could imitate three invisible gestures without an object, but only 8 of the 18 autistic students could do so. The failure to imitate gestures did not appear to be a failure to attend to the gestures. Two children did attend to the gestures performed by the adult, but did not perform any gestures. All others performed some act in response.

When vocal and gestural imitation were combined on the very brief Imitation scale of the Psychoeducational Profile (PEP), there was still a significant difference between the autistic and trainable groups. The trainable students again scored significantly higher than the autistic students. There are five motor imitation tasks on the PEP and five vocal imitation tasks. Five of the 18 autistic subjects did not perform any of the PEP imitations. Fourteen of the 18 autistic subjects did only half (or fewer) of the 10 imitations. All of the trainable children did at least two imitations and only five trainable children did only half (or fewer). Two of the autistic children performed two motor imitation tasks but no vocal imitation ones. One autistic child performed one vocal imitation task but no motor imitation task. One trainable child performed three vocal imitation tasks but no motor tasks. All other trainable children performed at least one imitation task in each area (motor and vocal).

The shortest sentence on the Sentence Imitation Scale of the Test of Language Development-Primary (TOLD-P) contains five words. Only

five of the autistic students and three of the trainable students could imitate that first sentence. The 28 other autistic and trainable students all failed to imitate the first sentence and earned scores of zero. Because of the high number of zero scores, these results were not analyzed statistically.

A very interesting and potentially important finding of this study was the fact that there was a significant difference between the autistic children's Vocal Imitation and Gestural Imitation scales of the Uzgiris and Hunt. The scale on which the autistic children scored significantly higher was the Gestural Imitation scale.

There was a significant difference between the autistic and trainable students on the Childhood Autism Rating Scale (CARS), indicating that the children placed in the three counties do have the characteristics usually associated with autistic children more than children with their same intellectual level placed in trainable programs. There were two autistic children who were rated as nonautistic and three trainable children who were rated as severely autistic. If the CARS were the only diagnostic criteria used, these five children would be improperly placed according to the guidelines of the scale. Four trainable children were rated as mildly-moderately autistic also.

There was no significant difference between the autistic and trainable groups in their development of the concept of object

permanence. Seven children in each group had achieved the highest level of object concept tested. Interestingly, this did not appear to be age related. Three of the four youngest autistic children and one of the four youngest trainable children were at that level.

Limitations

Several methodological factors caused limitations on the conclusions based on the findings of this investigation. The major one is the limited number of subjects. Also, the fact that subject selection was not done at random for autistic students and was done from a small number of possibilities for matches is a limitation.

The changing definition of autism and the fact that the children diagnosed as autistic according to the State of Florida definition may not be representative of children diagnosed as autistic in other states is a limitation. The fact that programs for autistic children have been in existence for only a few years means that the persons making diagnostic decisions have been inexperienced and may not have been consistent in decision making.

Conclusions

In this study, it has been found that children with low intellectual ability placed in autistic programs and those placed in trainable mentally handicapped programs in the State of Florida are different in several important ways.

Imitation is one of the most important keys to language development. Autistic students, according to the Florida definition,

have severe disorders of communication. They have limited abilities to communicate. The children in the autistic programs who were included in this study did exhibit disorders in communication, in so far as they were significantly lower than trainable children in ability to imitate vocally and gesturally.

They were also different in how they imitated. The autistic students imitated gesturally at a higher developmental level than they imitated vocally. This was not true of trainable students.

According to the definition of an autistic student used by professionals in Florida, the child must exhibit a severe disorder in behavior socialization. The autistic children in this study were significantly different from the trainable children on a rating scale of behavioral characteristics. The scale is used by educators to decide whether a child exhibits the autism syndrome. The staffing committees who made placement decisions for the children in this study did differentiate children with autistic behaviors, according to the CARS, when they placed the autistic children included.

The fact that there was no difference between the two groups on the test of object permanence suggests that in this area the children in the two groups are more alike than different. A lack of development of the object concept is not specific to autism. Autistic children of low intellectual level and trainable children develop object permanence equally.

Implications for Education and Further Research

This study included three domains of early cognitive development (object permanence, vocal imitation, and gestural imitation). Other domains of development of cognitive ability should be investigated also. Research should be done on the Development of Means for Obtaining Environmental Events, Development of Operational Causality, Construction of Objects in Space, and Development of Schemes for Relating to Objects subtests of the Uzgiris and Hunt Scales of Infant Psychological Development. Autistic students could be compared to the trainable group, as in this study, to another group, or to the autistic students' expected developmental level.

Object permanence need not be studied further except possibly with children younger than five. There is much evidence in the literature that school-age autistic children, even those with IQs in the trainable range, do not have a unique problem with object permanence. The performance of children in this study confirmed previous research findings.

Autistic students' difficulties with imitation should be studied further, so that imitation training can be a successful part of their educational program.

The fact that autistic children can imitate gesturally significantly better than they can imitate vocally should be taken into consideration when planning what method to use to increase

communication. Once the child can willingly imitate another person, then the next step would be for the child to initiate communicative gestures and verbalizations. Where would one start in the imitation training that becomes necessary in this sequence? This study provided information that indicates that the place to begin may be with imitation of gestures. The autistic child may be able to accomplish this with greater ease. Then the gestural imitation could be combined with its verbal equivalent. The child would be rewarded if either the gesture or the verbalization were imitated. One would hope that the gestural imitation would elicit the verbal imitation and make it less stressful than verbal imitation training alone. If a child showed more success in one kind of imitation (vocal or gestural), the other could be dropped.

Several observations made by the researcher have implications for research and interventions. Many of the autistic students in this study were fascinated by several wind-up, mechanical toys that made noises and shot sparks. Toy preferences and their use as rewards is an area for further study.

A number of the autistic students in this study showed that they were intrigued by smells or by the textures of materials. Research should be done to see if controlled smelling of provided objects or feeling of provided textured materials could be used as rewards to elicit desired behaviors. Research should also be done to

see if allowing the child to smell or feel provided items in a controlled situation would increase or decrease undesirable smelling or feeling behavior elsewhere.

Further study should be done regarding autistic students fascination with lights and shadows. Intervention strategies could then be developed to use lights and shadows to help train the autistic child to imitate.

Further research with autistic children should be conducted to investigate whether there is a direct correlation between ability to imitate and any of the particular bizarre behaviors associated with autism. If so, whether or not imitation improves when the behaviors have been brought under control should be investigated.

Although it is possible to test autistic children, they are often very difficult to test. One of the main problems a school psychologist might have is the unpredictable nature of autistic children's behaviors. These children can move very quickly and surprisingly. Research with video cameras should be done to help school psychologists know more about what kind of interfering behaviors to expect during testing.

Summation

The children in the autistic (profoundly handicapped) programs and the children in the trainable mentally handicapped programs in Broward, Duval, and Palm Beach Counties were found to be significantly

different on the Vocal Imitation and Gestural Imitation scales of the Uzgiris and Hunt Scales of Infant Psychological Development, on the Imitation scale of the Psychoeducational Profile (PEP), and on the behavioral characteristics of the Childhood Autism Rating Scale (CARS). They were not found to be significantly different on the Visual Pursuit and the Permanence of Objects scale of the Uzgiris and Hunt. Twenty-eight of the 36 students were unable to imitate the first sentence on the Sentence Imitation scale of the Test of Language Development-Primary. The sentence was composed of five words.

The autistic students were significantly different in their abilities to imitate vocally and gesturally. The trainable students were not.

Children placed in programs for autistic (profoundly handicapped0 and those within the same intellectual range, the same gender, and within six months in age, from the same counties who were placed in programs for trainable mentally handicapped were different on several important variables. They were also alike in some ways. It is not easy to diagnose a child and place that child in a program. However, with careful consideration of as much information as possible about the child and with as much knowledge as possible about current research on autism, appropriate decisions can be made by staffing committees. Then it will be possible to write educational plans that will be meaningful and helpful for the teachers who work with these exceptional students.

APPENDIX A
COVER LETTER

329 NW 16 Street

Delray Beach, Florida

April 27, 1987

Dear

As a school psychologist employed by the Broward County School Board, I have developed an interest in knowing more about how autistic children grow and learn. One way in which to investigate how a particular group of children develop is to compare them to another group. I have planned a research study as a part of the requirements for the Ph.D. degree in school psychology at the University of Florida. The study involves matching autistic children with trainable mentally handicapped children of the same age and gender.

Each child would be evaluated using several instruments. They are described in the enclosed Informed Consent. Also, the child's teacher would be asked to complete the Childhood Autism Rating Scale (CARS).

Your child has been chosen for inclusion in the study, either because of being autistic or as a trainable match. I urge you to read

the Informed Consent form, sign it in the presence of a friend as witness, and return it to me in the envelope that is also enclosed.

I assure you that your child will be evaluated with gentleness and respect. No stressful demands will be made.

Your consent for your child to be part of the study will be greatly appreciated. I will share with you after the research is completed.

Sincerely,

Sheila L. Scott, Ed.S.
School Psychologist

APPENDIX B
INFORMED CONSENT

I have been informed that Sheila L. Scott, Ed.S., a school psychologist employed by the Broward County School Board, is doing research on the developmental and behavioral characteristics of autistic children. She will match each autistic child included in the study with a trainable mentally handicapped child in order to discover the differentiations between the two groups. The hope is that the study will provide helpful information about both groups.

Mrs. Scott, a doctoral candidate at the University of Florida, will review each child's school and psychological services records for pertinent information. She will administer the Uzgiris-Hunt Scales of Infant Psychological Development to each child. These scales measure underlying intellectual processes associated with natural stages of development. They are flexible and undemanding and will take 30-60 minutes. They can be broken into several sessions if necessary. The Imitation Scales from the Psychoeducational Profile by Schopler and Reichler will also be used. It is made up of enjoyable activities and should take only 10-20 minutes. For those children who imitate words, the Sentence Imitation Scale of the Test of Language Development-Primary will also be used. The child will be asked to repeat sentences. It will take about 15 minutes. The Childhood Autism

Rating Scale (CARS) will be completed for each child, with the help of the child's teacher.

All information will be kept confidential within legal limits. No names or identifying information will be used in the written dissertation. I would like for information gained about my child to be summarized and placed in the school's records (check _____). I would prefer for specific information gained about my child to be seen only by the researcher (check _____).

I know that my child is free to withdraw from participation or I may withdraw my consent at any time without prejudice. There will be no monetary compensation for participating. However, the knowledge gained about my child and about autistic and trainable children will be shared with me.

I have read and I understand the procedure described above. I agree to have my child participate in the procedure. I have received a copy of this description.

Name of Child	Date
Signature of Parent or Guardian	Date
Second Parent or Witness	Date
Principal Investigator's Name	Date

Sheila L. Scott, 329 NW 16 Street, Delray Beach, FL 33444

Phone: 305-276-1528 (hm) or 305-772-2685 (bs)

APPENDIX C
EXAMINER'S NOTES DURING TESTING: AUTISTIC STUDENTS

Talked to self, not to examiner. Did not look for hidden object until asked to do so. Later, hid it himself.

Said, "I can't. I can't. Can you help?" Held hands to side of head.

Hit table. Hit blocks together. Would not do tasks using body alone, but did do them using objects. Looked away from examiner most of the time. Had a pained expression.

Would not look at objects, except ball. Tried to tie strings around self. Scratched Play-Doh. Acted afraid of kaleidoscope.

Rocked body. Tore paper in small bits. Kept putting hands under his shirt. Smelled aluminum foil. Put things in mouth, including Play-Doh.

Put toys away when we finished. Kept picking up my pen and trying to write.

Threw things down, except objects she liked (zylophone). Hit table with stick. Hit and kicked me. Flicked fingers between herself and light.

Ran hands down louvres on closet. Pushed and mashed objects. Grabbed examiner's arm. Drooled. Smelled Play-Doh. Tried to touch my nose instead of own.

Turned zylophone over and watched bottom as she pulled stick along underneath. Rubbed velvet with fingernails. Requested help. "Can you get it?" Bit tail off rubber dinosaur. Very echolalic.

Began chanting sounds when asked to imitate. Followed directions when firmly and clearly given. Put clay to mouth, but was reluctant to handle it. Poor eye contact.

Kept going to adjacent bathroom and turning light and window fan on. Watched fan.

Acted as though he was going to bite me. Never did. Pushed his chin against my hand and arm very hard.

Licked and smelled Play-Doh. Squeezed it. Laughed a lot. Grabbed my blouse and pulled on it several times. Put doll bottle in his mouth.

Chewed doll. Put all objects in mouth. Clicked teeth. Opened and shut mouth, but made no sounds. Felt of objects tentatively.

Echolalic. Perseverative. Made connections, such as, "Milk. Baby. Baby is drinking milk."

APPENDIX D
EXAMINER'S NOTES DURING TESTING: TRAINABLE STUDENTS

Smiled a lot. Calm. Cooperative.

Shaky. Poor motor control. Some echolalia. Chatted in three word sentences.

Motor problems, particularly left side.

Dropped small items. Described items to me. Made requests and asked for clarification.

Repeated some words in echolalic fashion.

Asked questions. Volunteered personal information in four, five, and six word sentences.

Threw toys. Cursed. Lightly kicked my feet under the table.

Poor articulation. Had puppet wriggle and "talk."

Spoke in five word sentences. Reversed phrases when imitating sentences. Stammered at times.

Flipped bottom lip with finger. Spun stacking rings and puzzle pieces. Jabbered nonsense.

Asked questions. Very echolalic. Directed music with stick.

Slightly echolalic. Grinned during testing, with a whimper and look of unease suddenly happening from time to time.

Used five word sentences to explain what was happening. Tried hard. Pleasant and smiling. Chatted with examiner.

Very echolalic and perseverative.

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BIOGRAPHICAL SKETCH

Sheila Scott is a Florida native who grew up crabbing and scalloping in St. Andrew's Bay. She graduated from Bay High School in Panama City in 1957. Her first college degree was a Bachelor of Music degree in Music Education from Wesleyan College in Macon, Georgia, in 1960. Two years later, she received a Master of Education degree in guidance and counseling from the University of Florida.

For over a decade, Sheila taught in public and private schools. She has been a music therapist in exceptional classes, a junior and senior high school music teacher, a teacher of educable and trainable mentally handicapped students, and a teacher of regular classes in grades one through five. She developed a summer creativity project, "Project Eagle," and she developed and directed an extended day program for a private school.

Sheila received a Specialist in Education degree in school psychology from the University of Florida in 1984 and she loves her new role. She first worked as a school psychologist in Duval County. For the past three years, she has been on the North Area Psychological Services team in Broward County.

Sheila is married to the Rev. John C. Scott, an Episcopal clergyman. Her daughter Sheryl is a medical doctor; her son, Ed, is a

sports reporter; and her son, Jonathan, is a high school student interested in commercial art. Sheila's father, husband, and son also graduated from the University of Florida.

Sheila enjoys reading at the beach in the afternoons, sitting beside her fireplace on cool South Florida "winter" evenings, and being engaged in writing projects at the word processor. She likes to share meals and ideas with family and friends. She is grateful for her role as "clergy spouse."

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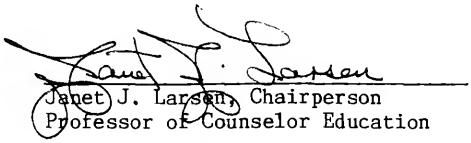

Janet J. Larsen, Chairperson
Professor of Counselor Education

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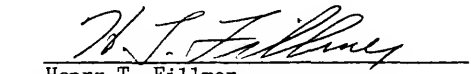

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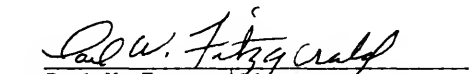

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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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